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SPIRITUAL BEINGS IN WEST AFRICA : THEIR CLASSES
AND FUNCTIONS.*

BY

ROBERT HAMILL NASSAU.

Inequalities among the spirits themselves are so great that they indicate simply differentiations of character or work. So radical are these varieties, and so distinct the names applied to them, that I am compelled to recognize a distinction into classes.

1. *Inina*, or *Ilina*. A human embodied soul is spoken of and fully believed in by all the tribes. It is known in the Mpongwe tribes of the Gaboon country as *Inina* (plural, *anina*) ; in the adjacent Benga tribe, *Ilina* (plural, *alina*) ; in the great interior Fang tribes, *Nsisim*.

This animating soul, whether it be only one, or whether it appear as two or three or even four, is practically the same and the only one that talks, hears and feels, that sometimes goes out of the body in a dream, and that exists as a spirit after the death of the body. That it has its own especial materiality seems to be indicated by the fact that, in the Fang, Bakele, and other tribes, the same word, *nsisim*, means not only *soul*, but also *shadow*. The shadow of a tree, or any other inanimate object, and of the human body, as cast by the sun, is *nsisim*.

In my first explorations up the Ogowe River, in 1874, as my village preaching necessarily and constantly spoke of our soul—its sins, its capacity for suffering or happiness, and its relation to its divine Maker—I was often at a loss how to make my thoughtless audience understand or appreciate that the “*nsisim*” of which I was speaking was not the *nsisim* cast by the sun as a darkish line

* See BULLETIN No. 5, 1901.

on the ground near their bodies. Even to those who understood me it was not an impossible thought that that dark narrow belt on the ground was in some way a part of or a mode of manifestation of that other thing, the nsisim, which they admitted was the source of the body's animation. So far defined was that thought with some of them that they said it was a possible thing for a human being to have his nsisim stolen or otherwise lost and still exist in a diseased and dying state, in which case his body would not cast a shadow. The story of "The man without a shadow" in actuality.

2. *Ibambo* (Mpongwe plural, abambo). There are vague beings, "abambo," which may well be described by our word "ghosts." Where they come from is not certainly known, or what locality they inhabit, except that they belong to the world of spirits. Why they become visible is also unknown. They are not called, they are only occasionally worshipped; their epiphany is dreaded, not reverenced.

The *ibambo* may appear anywhere and at any time and to anybody. But it has no message. It rarely speaks. Its most common effect on human lives is to frighten. It flits; it does not stand or remain in one spot, to speak or to be spoken to. Indistinctly seen, its appearances are reported as occurring mostly in dark places—in shadows, in twilight, and on dark nights. The most common places are lonely paths in the forest by night.

To all intents and purposes these abambo are what superstitious fears in our civilization call "ghosts." The timid dweller in civilization can no more tell us what that ghost is than can the ignorant African. It is as difficult in the one case as in the other to argue against the unreal and unknown. What the frightened eye or ear believes it saw or heard it persists in believing against all proof. Nor will ridicule make the belief less strong. However, the intelligent child in civilization, under the hand of a judicious parent or other friend, and relying on love as an expounder, can be led to understand, by daylight, that the white bark of a tree trunk shimmering in uncertain moonlight, or a white garment flapping in the wind, or a white animal grazing in the meadow, was the ghost whose waving form had scared him the night before. His superstition is not so ingrained by daily exercise but that reason and love can divest him of it. But, to the denizen of Fetich-land, superstition is religion; the night terror which he is sure he saw is too real a thing in his life to be identified, by day time, as only a harmless white barked tree or quartz rock.

3. A third class of spirits is represented by the names *Ombwiri*, *Nkinda*, and *Olaga*. The ombwiri (Mpongwe plural, awiri) is certainly somewhat local, and so far forth might be regarded as the ancient fauns and dryads, with a suggestion of Druidic worship of spirits resident in the dense oak groves and the massive stones of the Druid circle. But the *awiri* are more than dryads. They are not confined to their local rock, tree, bold promontory, or point of land, where they resent trespass by human beings. The traveller must go by silently, or with some cabalistic invocation, with bowed or bared head, and with some offering—anything, even a pebble. On the beach, as I bend to pass beneath an enormous tree fallen across the pathway, I observe the upper side of the log covered with votive offerings—pebbles, shells, leaves, etc.—laid there by travellers as they stooped to pass under. Such votive collections may be seen on many spots along the forest paths, deposited there by the natives as an invocation of a blessing on their journey.

While the ombwiri is indeed feared, it is with a respectful reverence, different from the scare of an ibambo. *Ombwiri* is something fine and admirable in vision (when seen, which is rare); it is white, like a white person. Souls of distinguished chiefs and other great men turn to Awiri. *Nkinda* are spirits of the common dead. The fear with which the native regards massive rocks and large trees—the ombwiri homes—need not be felt by white people; white people being themselves considered awiri, their bodies being inhabited by the departed spirits of the negro dead.

4. *Mondi*. There are beings, *Myondi* (Benga singular, mondi), who are passive agents in causing sickness, or in either aiding or hindering human plans. But they are not always simply passive; they are often active on their own account, or at their own pleasure, generally to injure. They are invoked at the new moons; and at any other times, particularly in sickness. The native *oganga* decides whether or no they be myondi that are afflicting the patient. This diagnosis being made, and myondi being declared as present in the patient's body, the indication is that they are to be exorcised.

A slight doubt must be admitted in regard to these myondi, whether they do constitute a distinct and separate class, or whether any spirit of any class may not become a mondi. The name in that case would be given them, not as a class but as producers of certain effects, at certain times and under certain circumstances.

5. *Yaka*. There seems to be another class, somewhat like the

ancient lares and penates, belonging to the household, worshipped by a family, and associated with a certain family-fetich called *yaka*. This form descends by inheritance with the family. In its honour is sacredly kept a bundle of toes, fingers, or other bones, nail clippings, eyes, brains, etc., etc., accumulated from deceased members of successive generations. This is distinctly an ancestral worship.

The worship of ancestors is a marked and distinguishing characteristic of the religious system of Southern Africa. This is something more definite and intelligible than the religious ceremonies performed in connection with the other classes of spirits.—*Wilson*.

What was described by Dr. Wilson as respect for the aged among the tribes of Southern Guinea, forty years ago, is true still, in a large measure even where foreign customs and examples of foreign traders and the practices of foreign Governments have broken down native etiquette and native patriarchal government. Perhaps there is no part of the world where respect and veneration for age are carried to a greater length than among this people. For those who are in office, and who have been successful in trade, or in war, or in any other way have rendered themselves distinguished among their fellow-men, this respect, in some outward forms at least, amounts almost to adoration ; and proportionately so when the person has attained to advanced age. All the younger members of society are early trained to show the utmost deference to age. They must never come into the presence of aged persons or pass by their dwellings without taking off their hats and assuming a crouching gait. When seated in their presence it must always be at a "respectful distance"—a distance proportioned to the difference in their ages and position in society. If they come near enough to hand an aged man a lighted pipe or a glass of water, the bearer must always fall upon one knee. Aged persons must always be addressed as "father" (*rera, lale, paia*) or "mother" (*ngwe, ina*). Any disrespectful deportment or reproachful language toward such persons is regarded as a misdemeanour of no ordinary aggravation. A youthful person carefully avoids communicating any disagreeable intelligence to such persons, and almost always addresses them in terms of flattery and adulmentation. And there is nothing which a young person so much deprecates as the curse of an aged person, and especially that of a revered father.

6. Possibly there is a sixth class. There may enter into any animal's body (generally a leopard's) some spirit or, even temporarily, the soul of a living human being. The animal then, guided by

human intelligence and will, exercises its strength for the purposes of the temporary human possessor. Many murders are said to be committed in this way—after the manner of the mythical German *wehr-wolf* or the *loup-garou*.

The powers and functions of the several classes of spirits do not seem to be distinctly defined. Certainly they do not confine themselves either to their recognised locality nor to the usually understood activity pertaining to their class. These powers and functions shade into each other, or may be assumed by members of any class. But (1) it is clearly believed that spirits, even of a given class, differ in power among themselves from the other members of that same class. Some are strong, others are weak. (2) They are limited as to the nature of their powers; not *any* spirit can do *all* things. (3) A spirit's efficiency runs only on a certain line or *lines*. (4) All of them can be influenced and be made subservient to human wishes by a variety of incantations.

1. Functions of the first class, or *Anina*.

While embodied in a human form, they constitute the life-principle that demonstrates itself through the various senses, and that lives after the body is dead, continuing itself in the unseen world, with all the same feelings and actuated by the same passions as when embodied as a human soul.

So few are the special activities by which to distinguish them from other classes of spirits that I might doubt whether they should properly be considered as distinct were it not true that the *Anina* are all of them *disembodied* spirits; none of them are of other possible origin. As disembodied spirits retaining memory of their former human relationships they have an interest in human affairs, and especially in the affairs of the family of which they were lately members.

2. Functions of the second class, or *Abambo*.

They are one of the two classes of spirits the worship of which forms the most prominent feature in the superstitious practices of the country.

The term *abambo* is in the plural form, and may, therefore, be regarded as forming a class of spirits instead of a single individual. They are the spirits of dead men; but whether they are positively good or positively evil, to be loved or to be hated, or to be courted or avoided, are points which no native of the country can answer satisfactorily. *Abambo* are the spirits of the ancestors of the people, as distinguished from the spirits of strangers. These are the spirits with which men are possessed, and there is no end to the ceremonies used to deliver them from their power.

3. The functions of the third class, *Awiri*.

These spirits are sometimes spoken of as *Nkinda*, *Oлага* (Mpongwe plural, *Inaga*). They all come from the spirits of the dead. These several names do not indicate a difference as to kind or class of spirit, but a difference in the work or functions they are called upon to exercise. The *Inaga* are spirits of strangers, and have come from a distance.

The derivation of the word *Ombwiri* is not known. As it is used in the plural as well as in the singular form, it no doubt represents a class or family of spirits. He is regarded as a tutelar or guardian spirit. Almost every man has his own *ombwiri*, for which he provides a small house near his own. All the harm that he has escaped in this world, and all the good secured, are ascribed to the kindly offices of this guardian spirit. *Ombwiri* is also regarded as the author of everything in the world which is marvellous or mysterious. Any remarkable feature in the physical aspect of the country, any notable phenomenon in the heavens, or extraordinary events in the affairs of men are ascribed to *Ombwiri*. His favorite places of abode are the summits of high mountains, deep caverns, large rocks, and the base of very large forest trees. And while the people attach no malignity to his character, they carefully guard against all unnecessary familiarity in their intercourse with him, and never pass a place where he is supposed to dwell except in silence. He is the only one of all the spirits recognized by the people that has no priesthood; his intercourse with men being direct and immediate.

Sick persons, and especially those that are afflicted with nervous disorders, are supposed to be possessed by one or the other of these spirits. If the disease assumes a serious form the patient is taken to a priest or a priestess of one or the other of these spirits. Certain tests are applied, and it is soon ascertained to which class the disease belongs, and the patient is accordingly turned over to the proper priest. The ceremonies in the two cases are not materially different; they are alike, at least, in the employment of an almost endless round of absurd, unmeaning, and disgusting ceremonies which none but a heathenish and ignorant priesthood could invent, and none but a poor, ignorant, and superstitious people could ever tolerate.

In either case a temporary shanty is erected in the middle of the street for the occupancy of the patient, the priest, and such persons as are to take part in the ceremony of exorcism. The time employed in performing the ceremonies is seldom less than ten or fifteen days. During this period dancing, drumming, feasting, and drinking are kept up without intermission day and night, and all at the expense of the nearest relative of the invalid. The patient, if a female, is decked out in the most fantastic costume; her face, bosom, arms, and legs are streaked with red and white chalk, her head adorned with red feathers, and much of the time she prome-

nades the open space in front of the shanty with a sword in her hand, which she brandishes in a very menacing way against the bystanders. At the same time she assumes as much of the maniac in her looks, actions, gestures, and walk as possible. In many cases this is all mere affectation, and no one is deceived by it. But there are other cases where these notions seem involuntary and entirely beyond the control of the person; and when you watch the wild and unnatural stare, the convulsive movements of the limbs and body, the unnatural posture into which the whole frame is occasionally thrown, the gnashing of the teeth, and foaming at the mouth, and supernatural strength that is put forth when any attempt is made at constraint, you are strongly reminded of cases of real possession recorded in the New Testament.

There is no reason to suppose that any real cures are effected by these prolonged ceremonies. In certain nervous affections the excitement is kept up until utter exhaustion takes place; and if the patient is kept quiet afterwards (which is generally the case) she may be restored to better health after a while; and, no matter how long it may be before she recovers from this severe tax upon her nerves, the priest claims the credit of it. In other cases the patient may not have been diseased at all, and, of course, there was nothing to be recovered from.

If it should become a case of undissembled sickness, and the patient become worse by this unnatural treatment, she is removed, and the ceremonies are suspended, and it is concluded that it was not a real possession, but something else. The priests have certain tests by which it is known when the patient is healed, and the whole transaction is wound up when the fees are paid. In all cases of this kind it is impossible to say whether the devil has really been cast out or merely a better understanding arrived at between him and the person he has been tormenting. The individual is required to build a little house or temple for the spirit near his own, to take occasional offerings to him, and pay all due respect to his character, or to be subject to renewed assaults at any time. Certain restrictions are imposed upon the person who has recovered from these satanic influences. He must refrain from certain kinds of food, avoid certain places of common resort, and perform certain duties; and, for the neglect of any of these, is sure to be severely scourged by a return of his malady. Like the Jews, in speaking of the actions of these demoniacs, they are said to be done by the spirit, and not by the person who is possessed. If the person performs any unnatural or revolting act—as the biting off of the head

of a live chicken and sucking its blood—it is said that the spirit, not the man, has done it.

But the views of the great mass of the people on these subjects are exceedingly vague and indefinite. They attend these ceremonies on account of the parade and excitement that usually accompany them, but they have no knowledge of their origin, their true nature, or of their results. Many submit to the ceremonies, because they are persuaded to do so by their friends, and, no doubt, in many cases in the hope of being freed from some troublesome malady. But as to the meaning of the ceremonies themselves, or the real influence which they exert upon their bodily diseases, they probably have many doubts, and when called upon to give explanation of the process which they have passed through, they show that they have none but the most confused ideas.

4. The functions of the fourth class, *Myondi*.

These are much the same as those of the third class, except that in power they seem to be more independent than other spirits. They are active, self-willed, and generally malignant causes of disease, and they are worshipped almost always only in a deprecatory way. They often take violent possession of human bodies; and for their expulsion it is that Inaga, Nkinda, and Awiri are invoked.

5. Functions of the spirit of the family-fetish, *Eyaka* (Benga plural, Byaka). The respect for parents and other aged persons already referred to in this chapter,

by a very natural operation of the mind, is turned into idolatrous regard for them when dead. It is not supposed that they are divested of their power and influence by death; but, on the contrary, they are raised to a higher and more powerful sphere of influence, and hence the natural disposition of the living, and especially those related to them in any way in this world, to look to them and call upon them for aid in all the emergencies and trials of life. It is no uncommon thing to see large groups of men and women, in times of peril or distress, assembled along the brow of some commanding eminence, or along the skirts of some dense forest, calling in the most piteous and touching tones upon the spirits of their ancestors.

Images are used in the worship of ancestors, but they are seldom exposed to public view. They are kept in some secret corner, and the man who has them in charge especially if they are intended to represent a father or predecessor in office, takes food and drink to them, and a very small portion of almost everything that is gained in trade.

But a yet more prominent feature of this ancestral worship is to be found in the preservation and adoration of the bones of the dead, which may be fairly regarded as a species of relic worship. The skulls of distinguished persons are preserved with the utmost care, but always kept out of sight. I have known the head of a distinguished man to be dissevered from the body when it was but partially decomposed,

and suspended so as to drip upon a mass of chalk provided for the purpose. The brain is supposed to be the seat of wisdom, and the chalk absorbs this by being placed under the head during the process of decomposition. By applying this to the foreheads of the living, it is supposed they will imbibe the wisdom of the person whose brain has dripped upon the chalk.

In some cases all the bones of a beloved father or mother, having been dried, are kept in a wooden chest, for which a small house is provided, where the son or daughter goes stately to hold communication with their spirits. They do not pretend to have any audible responses from them, but it is a relief to their minds in their more serious moods to go and pour out all the sorrows of their heart in the ear of a revered parent.

This belief, however much of superstition it involves, exerts a very powerful influence upon the social character of the people. It establishes a bond of affection between the parent and child much stronger than could be expected among a people wholly given up to heathenism. It teaches the child to look up to the parent not only as its earthly protector, but as a friend in the spirit land. It strengthens the bonds of filial affection, and keeps up a lively impression of a future state of being. The living prize the aid of the dead, and it is not uncommon to send messages to them by some one who is on the point of dying; and so greatly is this aid prized by the living, that I have known an aged mother to avoid the presence of her sons, lest she should by some secret means be dispatched prematurely to the spirit world, for the double purpose of easing them of the burden of taking care of her and securing for themselves more effective aid than she could render them in this world.

All their dreams are construed into visits from the spirits of their deceased friends. The cautions, hints and warnings which come to them through this source are received with the most serious and deferential attention, and are always acted upon in their waking hours. The habit of relating their dreams, which is universal, greatly promotes the habit of dreaming itself, and hence their sleeping hours are characterized by almost as much intercourse with the dead as their waking hours are with the living. This is, no doubt, one of the reasons of their excessive superstition. Their imaginations become so lively that they can scarcely distinguish between their dreams and their waking thoughts, between the real and the ideal, and they consequently utter falsehood without intending, and profess to see things which never existed.—See DR. WILSON, *Western Africa*.

All that is quoted above from Dr. Wilson is still true among tribes not touched by civilization. What he relates of the love of children for parents and the desire to communicate with their departed spirits is particularly true of the children of men and women who have held honourable position in the community while they were living. And it is also all consistent with what I have described of the fear with which the dead are regarded and the dread lest they should revenge some injury done them in life. The common people and those who had neglected their friends in any way would be the ones who would dread this. The better classes, especially of the superior tribes, would be the ones to hold their dead in affectionate remembrance.

I have met with instances of the preservation of a parent's

brains for fetich purposes, as mentioned above by Dr. Wilson. As honoured guest I have been given the best room in which to sleep overnight. On a flat stone, in a corner of the room, was a pile of greyish substance; it was chalk mixed with the decomposed brain matter that had dripped on it from the skull that formerly had been suspended above it. I then remembered how, on visiting chiefs in their villages, they frequently were not in the public reception room on my arrival; but I was kept awaiting them. They had been apprized of the white man's approach, had retired to their bedrooms, and when they reappeared it was with their foreheads and sometimes with other parts of their bodies marked with that greyish mixture. The object was that they be given wisdom and success in any question of diplomacy or in a favour they might be asking of the white man.

6. Functions of what is possibly a sixth class.

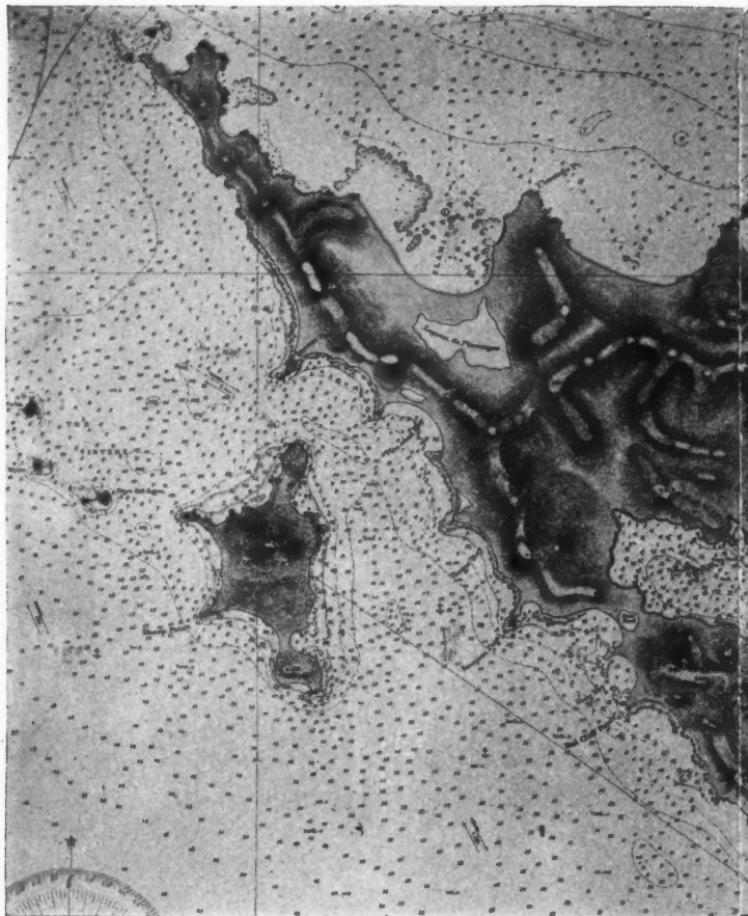
This belief in demoniacal possession of a lower animal must not be confounded with the equally-believed transmigration of souls. It is widespread over at least a third of the African continent. In Mashonaland

they believe that at times both living and dead persons can change themselves into animals, either to execute some vengeance or to procure something they wish for; thus a man will change himself into a hyena or a lion to steal a sheep and make a good meal off it; into a serpent to avenge himself on some enemy. At other times, if they see a serpent it is one of the Matotela tribe or slave tribe, which has thus transformed himself to take some vengeance on the Barotse (*Décle*).

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CULEBRA ISLAND.

U. S. Hydrographic Office Chart.



CULEBRA ISLAND.

BY

A. C. HAESELBARTH.

Culebra Island is a part of Porto Rico, and was ceded with Vieques by the Treaty of Paris. It is 53 miles from San Juan, 17 miles from St. Thomas, and 19 miles from Vieques. Its exact situation is between latitudes $18^{\circ} 15'$ and $18^{\circ} 23'$ north and longitudes $65^{\circ} 10'$ and $65^{\circ} 25'$ west. It is a bunch of picturesque hills, ranging in height from 150 to 650 feet. The island proper is approximately 7 miles long and 3 miles wide. Northeast island, 1 mile long, is $2\frac{1}{2}$ miles from the mainland, and Culebrita, of the same size, is $3\frac{1}{4}$ miles from the mainland, and bears, on a bluff 300 feet high, a lighthouse in which is a fixed white light that can be seen 21 miles at sea.

Culebra proper has numerous harbours, of which the best are Target Bay, Great Harbour, and Mosquito Bay on the south side; Swell Bay, Surf Bay, and Flamingo Bay on the north side, and Mangrove Harbour at the east end. The village of Culebra and the marine camp are at the head of Great Harbour, which is practically landlocked. On the highest hill of the island, at an elevation of 650 feet, is the Government signal station, from which the approach of a large vessel or fleet from any direction can be seen thirty miles out at sea. A telephone line connects this station and the marine camp. Thus far no attempt has been made to fortify the island beyond mounting a 5-inch gun in a commanding position and three smaller guns at the marine camp. The island, however, could quickly be made a formidable spot, being a natural fortification.

Great Harbour, which the Government is said to favour as a naval station in preference to San Juan harbour, Porto Rico, was so named by the British, but has long been called Ensenada Honda by the Spanish and Porto Rican mariners, who have taken refuge in the same many times. It is protected from the winds and defended on all sides. Its waters are as tranquil as those of a lake, and the largest fleet in the world can find accommodation therein, in view of the depth and the fact that its bottom is free from all obstructions. A small canal could be cut through the little neck of land in the Playa Sardinas so as to establish an outlet for the waters of

the harbour. This bay, so favoured by nature, can be considered the finest harbour in the Antilles, and the one that has suffered the least from the havoc of cyclones.

One and a half miles to the southwest of Culebra lies the isle of Luis Pefia or Southwest Island, which is about a mile long, and is in a complete state of abandonment. This isle and the Punta del Soldado form the harbour that has been used from time immemorial by the warships that visit the island for exercises, on account of the fact that it is well defended and has two beautiful shores, suitable for effective landings.

On the north coast there is no port except the small open bay called Flamencos or Flamingo, which can be entered at a great risk by small boats only.

The camp at Culebra, called Camp Roosevelt, is on a bluff near the village, and is cooled by an ever-present breeze. Fresh water is supplied from a big water barge in the bay, potable water being extremely scarce in the island. There are no rivers, but in the rainy season a stream is formed in a ravine running from the centre of the island to the east of the village and emptying into Great Harbour.

It is a lack of water that is likely to prove the most serious drawback to the future development of Culebra. The water is mostly brackish. Copious wells have been dug in several places. The waters of these wells are given to cattle and are used for domestic purposes ; there are, however, four or five of them whose waters are drunk by the colonists. In the town there are two public cisterns of regular size. One of these was built in 1889, during the Spanish administration, with Government funds and with the aid of the colonists ; the other one was built after the occupation of the island by the Americans with moneys collected for the relief of the victims of the cyclone of "San Ciriaco" (Aug. 8th, 1899), and donated by the Board of Charities to the inhabitants of Culebra. There are also some private cisterns in the town and in the country, in which rain water is collected.

There is a hamlet to which, when founded, was given the name of San Ildefonso ; there are several streets in this hamlet, which has sixty-two houses of fair construction, and in the four wards, viz. : Pueblo, San Isidro, Fraile, and Playa Sardinas, there are about eighty-five houses, twenty of which are fairly good, while most of the others are mere huts ; the total number of inhabitants is 704.

The products of the island are maize, beans, and other grains,

plantains, bananas of various kinds, sweet potatoes and other tubers, and fruits, such as cocoanuts, mangoes, etc. There are good farms fit for cattle-raising ; and the raising of domestic fowls is very easy. Several experiments have been made in sugar-cane-raising, and the results have been very good. Quite a little tobacco is raised on the island, and this is manufactured into chewing tobacco on account of its juiciness. Cotton, also, is produced, and yields abundant crops of a very superior quality of fibre. This plant grows in a semi-wild state, and the care of it costs very little.

The island suffers greatly from drought on account of its small size, and because the strong winds keep the rains from falling five or six months in the year. When the products of the island had a market in St. Thomas, agriculture flourished; but since 1898, when the island lost the privilege of taking its products to the Danish West Indies, its only market, agriculture was abandoned, and to-day yields but very little.

The commerce of the island is in the hands of five merchants, who do business on a small scale, and who import the goods they handle from San Juan, Fajardo, and Vieques. There are no industries, and the exports of the island consist of the minor produce, shipped to Vieques, Fajardo, and even to San Juan ; cattle, shipped to Vieques, Fajardo, and San Juan, and in some years to St. Thomas ; tortoise shells, which abound on the island, and are shipped to the same markets as the cattle.

The cattle are as fine as any in the world; and I venture the opinion that cattle-raising in Culebra will yet yield big profits to men who engage in it. There are now on the island 2,215 head of cattle, divided as follows : Horses, 201 ; asses, 4 ; bovine cattle, 1,355 ; sheep, 150 ; goats, 325 ; swine, 180. These are valued at \$27,911.

There are sixty-six country properties, with about 4,000 "cultivated" acres, of which 2,639 acres are simply cleared lands devoted to pasture. Tobacco, bananas, and minor products use about 300 acres, and there are 900 acres of wood and brush land. By President Roosevelt's order of December 18, 1901, all the public lands were put under the control of the Navy Department, excepting some in the interior of the island. The use of plots a little more than sixty acres each can be obtained in return for labour for the Government, but the holders are liable to eviction on brief notice.

The public buildings on the island are few. There are two schoolhouses, built with insular funds in 1892 ; a tiny Catholic

church, built in 1890 by the Catholics of Porto Rico ; a police station, now used as a residence of school teachers ; and the public cistern. There is a tiny wharf, at very deep water, where, if a naval station is established, the coal piles will be located. The Governor lives in the Casa Blanca, a two-story unpainted frame building near the wharf. There is a cemetery, to which an average of but four bodies a year are added, and on the wall of which rests the public coffin, in which all corpses are carried to the burying-ground.

Up to the beginning of the last century this island was the lurking-place of pirates, whence a little key in this splendid bay derives its name. This bay was called Great Harbour by the English, who drew the first plan or map of the island, sometime about 1838.

The first name of the island was Isla del Pasage, which seemed to indicate that it was the proper place to stop at in long inter-oceanic navigations; but later on Porto Rican mariners and fishermen changed this name to Culebra, which means *snake*, on account of the peculiar shape of the island.

Up to 1880 the island was visited by none but small craft conveying persons engaged in fishing, charcoal-burning, and wood-chopping ; the best timber, such as the Guayaco (*Guaiacum officinale*), being felled and taken to St. Thomas, St. Croix, or other islands, without any permission; and it is to be supposed that this was what led the Government of Spain to look upon colonizing the island as a necessity.

Between 1870 and 1876 there lived on the island, at the place called "Tamarindo," one Stiven, a negro from Tortola (British colony), who called himself the Governor of the island, and commanded the respect of even the Porto Rican fishermen. Stiven was found murdered one day, and when the news of this assassination reached the Spanish authorities in Vieques they sent troops to Culebra ; twelve small foreign boats were seized, and about forty men engaged in fishing, charcoal-burning, and wood-chopping without permission from the representatives of the Spanish Crown were arrested. Much attention was drawn towards the colonization of the island by this event ; and had it not taken place it is nearly certain that the "Tortoleños," or inhabitants of Tortola, who are British subjects, would have taken possession of the island. It also happened that foreign men-of-war, especially German, used the water and shores of the island for naval exercises, and evidences of this are still found in many parts of the southern coast and in the most accessible parts of the island, where projectiles

have been found which, on account of their shape, etc., are calculated to be at least fifty years old. In 1887 three German men-of-war visited the island with the object of making naval exercises, and a force of the Guardia Civil was sent to the island to afford protection to the delegate, whose presence in Culebra, with many colonists, proved that Spain had occupied the island.

A circular issued by the General Government of Porto Rico on May 13th, 1879, opened the road to colonization of Culebra, and a Royal Order of March 15th, 1881, granted, among other concessions, that of freedom of the ports of the island.

It was not until 1884-1885 that the amounts necessary to defray the expenses of the colonization of the island of Culebra were included in the budget of Porto Rico.

In 1886 trafficking between St. Thomas and Porto Rico, conducted in sailing craft, assumed such importance that it attracted the attention of the Spanish Consul at St. Thomas, who communicated with the General Government of Porto Rico on the matter. It happened that the port of the island of Culebra was used as a roadstead by the smugglers, who, evading the vigilance of the revenue officials, introduced into Porto Rico from St. Thomas goods subject to the payment of import duties. One of the principal articles smuggled was Kentucky and Virginia leaf tobacco. The result was that the traffic in vessels plying between St. Thomas and Culebra was declared illegal, except when the vessels had secured a written permit from the Consul of Spain at St. Thomas.

Official statistics show that in 1894 goods valued at \$6,630.49 were imported into Culebra, and products of this island, valued at \$7,184.20, were exported.

The most important articles were : cattle, sweet potatoes, plantains, chewing tobacco, pumpkins, beans, domestic fowls, tortoise shell, charcoal, Indian corn, and mangle bark.

Delegate Delgado says that great damage has been done to the interests of the island by annexing it to Vieques, in view of the distance that separates the two islands. He thinks that Culebra should continue as heretofore—never as a dependency of any other municipality of Porto Rico. He says it is necessary, in view of the exceptional condition of its coasts and ports, that the Governor of Porto Rico have a special representative in the island, since it is periodically visited by war vessels, and is called to be a stronghold, naval station, coaling station, or a penitentiary.

It may be said that there are no roads in Culebra, travelling being entirely over narrow trails, on sure-footed horses. These

horses are worth from \$30.00 to \$50.00 there. The natives ride, as they do elsewhere in the West Indies, with huge wicker baskets on either side of the little beasts, which patiently carry heavy loads. Everywhere the undisturbed charm of the tropics remains. The views are magnificent from the hills, and the gallops along the stretches of beach by a rolling surf are never to be forgotten.

THE ECONOMIC GEOGRAPHY OF THE ARGENTINE REPUBLIC.

BY

J. RUSSELL SMITH.

General Description.—The Argentine Republic is, in a general way, the southern counterpart for the region lying between the Missouri-Mississippi River and the watershed of the Rocky Mountains. Each of these sections begins near the tropics, with a region of heavy rainfall and forests. From these centres of humidity the rainfall decreases toward the interior, and is accompanied by corresponding changes in the vegetation. In the United States the low-lying eastern part of the western half of the Mississippi Valley is forest-covered; then to the westward are the open plains, where corn and wheat are grown, the wheat going the farther westward, and finally giving way in the region of increasing aridity, where only pastoral industries can survive without irrigation. The supply of water for this purpose is mainly derived from the mountain streams at the western edge of the Great Plains, where thriving agricultural settlements are growing up in New Mexico, Colorado, and Montana. The Argentine Republic duplicates these zones. She has in the northeast a rainy forest belt, a corn belt, a wheat belt, then a wide stretch of semi-arid and arid plain, and finally at the foot of the Andes a succession of agricultural settlements, depending upon the water supply from the Andean snowfields. Both of the regions under consideration are extended and usually level plains that have been in great part deposited by erosion from the continental axis to the westward; but the comparison must not be carried too far, for there are minor differences that make Argentina the least valuable of the two areas. The forested region is smaller, and the wood less valuable; the grain-growing belt is nar-

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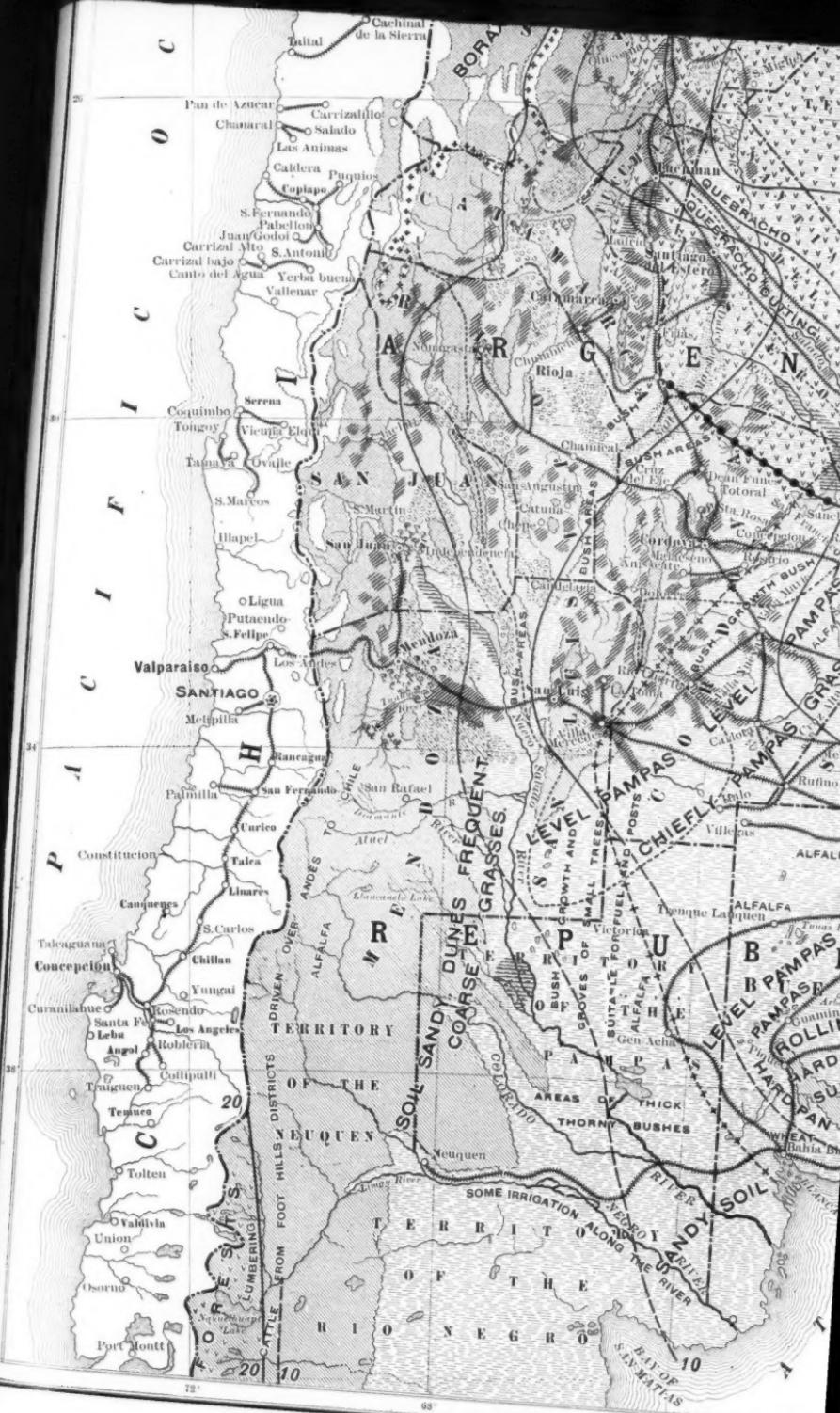
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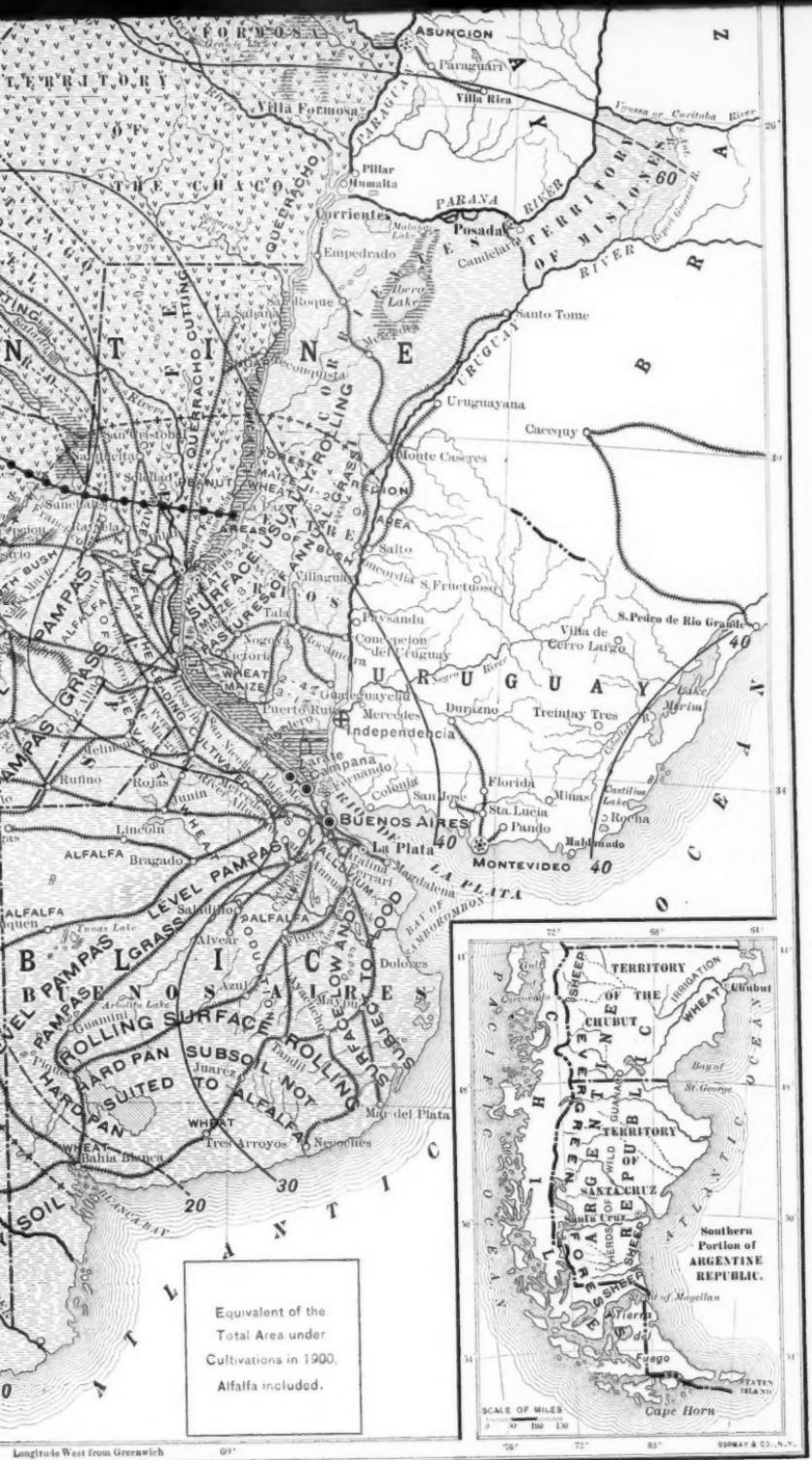
AN ECONOMIC MAP
OF THE
ARGENTINE REPUBLIC

SCALE OF MILES

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rower, the arid belt is more arid, and the greater length from north to south gives the Argentina a tropic section in the latitude corresponding to Yucatan, and a cold temperate section reaching a higher latitude than the Saskatchewan River in Assiniboina. Despite these drawbacks, the Argentine Republic has large production and larger possibilities in both pasturage and agriculture, and considerable promise in her forests and minerals.

Mineral Resources.—The present mineral production of Argentina is slight. Lignite is found in several provinces, but it has not been successfully utilized, and, owing to the lack of coal, there is no iron manufacture. A small amount of petroleum is produced in Mendoza. In the extreme northwest, in the high and desert plateaux of the Andes, are extensive deposits of borates, which have recently been worked in a small way, but there is as yet no adequate outlet by which the product can reach the sea coast. Gold is found in the Andes, but the operations have been insignificant, and chiefly in the far south, where placer mines have been exploited in the Island of Tierra del Fuego. In 1900, 212 ounces of gold were produced.

Despite the meagre output of minerals, there is good geological reason for the belief that there is considerable mineral wealth. Western Argentina comprises the eastern slope of the Andean mountain system. The western side of this range in Chile is rich in deposits that are probably duplicated in some places on the other side of the range. Ore finds are constantly being reported in Argentina, but the great distance from a base of operations upon the sea coast and the lack of transport facilities have thus far prevented their development. The great agricultural and pastoral resources of the country have provided employment for the scanty supplies of labour and capital.

Forest Resources.—The forest resources of the Argentine Republic lie at the extremes of the country—the tropic and sub-tropic forests of the north and the evergreen forests of the south. Both are so far away from the centres of population and industry, and in locations so difficult of access, that the greater part of the lumber supply has been imported. The southern forests of Araucanian pine occupy considerable areas along the Andes in lower Patagonia and in Tierra del Fuego. Some lumbering has been done in places easily accessible from the sea, but this region is a remote and, until recently, unsettled frontier, as far from Buenos Aires as the coast of southern Labrador is from Boston.

The northern forests are made to contribute more to the economic life of the Republic, yet the larger part of this section is as little known as interior Patagonia. It is known as "El Gran Chaco" (the Great Hunting Ground), and is held by a few wandering tribes of hostile Indians, who have thus far resisted all efforts to explore the interior. The tree growth begins with thorn thickets as far south as the Rio Colorado, in about latitude 41° . These thickets are replaced northward by groves of small trees suitable for fuel and posts, and giving a park landscape to the eastern part of Pampa Territory and much of Cordoba. This growth does not go eastward into the Province of Buenos Aires nor into Santa Fé until latitude 31° is reached. Here the increasing rainfall raises the tree growth into a forest that extends northward into Bolivia, and often presents impassable jungle. The most valuable product of this zone is the wood of the red quebracho tree, commonly called quebracho colorado (*Quebrachia Lorentzii* or *Loxopterigium Lorentzii*). It has great hardness, weight, and durability, and produces a valuable extract containing tannin. The wood lasts well in air, water, or earth, and has been widely used in the construction of Argentine railroads, serving as ties, bridge timbers, and telegraph poles. The tannin content is usually from 10–20%, but the finest grade of quebracho growing in a strip from fifteen to twenty miles wide along the west bank of the Parana is said to yield from 22 to 28%.* The high quality of leather produced by this extract has led to the exportation of the wood to Europe. The shipments† were 29,700 tons in 1892, 155,000 tons in 1895, 225,000 tons in 1900. It was all used for tanning purposes, and successful experiments at extracting the tannin near the scene of production have caused a large increase in the business, which has attracted German, British, French, and American capital.

The quebracho tree is from 35 to 45 feet in height, from 12 to 40 inches in diameter (rarely above 20), and is found‡ in abundance in the region bounded by 30° and 22° south and 58° and 65° west longitude. This area of 125,000 square miles is larger than Georgia and Florida combined, and, according to the estimate of a recent German writer,§ contains reserves of quebracho wood to the extent

* Bulletin of Bureau of American Republics. Vol. XI, p. 881.

† Bulletin of Bureau of American Republics, Vol. XI, p. 881.

‡ K. Kaerger *Landwirtschaft & Kolonisation im Spanischen Amerika.* 1 Band. Die La Plata-Staaten. Duncker & Humblot, Leipzig, 1902, p. 816.

§ Quoted in *Annales de Géographie*, No. 57, p. 258.

of 168,750,000 tons—enough to give secure basis for a large development of the lumber and tannin industries.*

The Pastoral Industries.—The pastoral industries furnish the most important element in the wealth of the Argentine Republic. This country, like the western part of the Mississippi Valley, began its industrial history as a cattle range. This was the leading industry and the sole basis of the export trade from the founding of the colony late in the 16th century until 1848, when regular exports of wool began and increased with great rapidity.

About the middle of the 19th century efforts to introduce agriculture resulted in the successful growing of grain. The supply was inadequate for the home market, and regular importations were made from southern Brazil, Chile, and other countries till, in 1873, a surplus of wheat was placed upon the world's market. Since that date the advance has been rapid, and Argentina is now an important exporter of grain. The development of agriculture has not, however, caught up with the pastoral industries, which still furnish over half of the total exports of the country.

The cattle and sheep reported by the census of 1895 were respectively 21,702,000 and 74,380,000. In 1900 the cattle were estimated at 28,000,000, giving Argentina the third rank—United States having 44 million and Russia 30 $\frac{1}{2}$ million. In 1901 the estimated number of sheep was 120 $\frac{1}{2}$ million, giving Argentina the first rank, as Australia had 70 million in 1900 and the United States 42 million. The wool clip was 250,000 tons in 1901.

The exports of animal products were valued at 115 $\frac{1}{2}$ million dollars in 1899, and 71 $\frac{1}{4}$ millions in 1900. Wool is the most important item, but improvements in transportation are making meat and live animals of increasing importance. Both are now regularly shipped to Europe, more than 100,000 live animals having been sent in a single year. In 1900 (the latest statistics available) the shipments of frozen meat amounted to 261,000 quarters of beef and 2 $\frac{1}{4}$ million sheep. Other important articles are hides, sheep skins, tallow, and jerked beef for consumption in tropical countries.

The uneven distribution of the flocks and herds throughout the country is, like the agriculture, dependent upon varying climatic

* The merchantable quebracho is all found north of a line running from the Parana at 31 S. to El Recreo 65 W. 29 $\frac{1}{3}$ S., thence along the slopes of the Andes.

† *Annales de Géographie*, p. 252.

‡ *Bulletin of Bureau of American Republics*, July, 1901, p. 48.

conditions. As barns for stabling or shelter for live stock are practically unknown in Argentina, the questions of moisture and temperature are doubly important, affecting as they do every condition, both of food supply and physical survival. Cattle are not well protected by nature against cold, and the herds do not thrive south of the Province of Buenos Aires.* The winter temperature is sometimes extreme, and the "pampero" or southwest wind-storms blow from the Patagonian highlands with great severity. The extremes of moisture and heat, however, are borne by cattle better than by any of the other domestic animals of the temperate zone. They can survive an annual rainfall of 80 inches, and the cattle industry extends northward into Salta and Jujuy, the subtropical provinces of the northwest, and, in a small way, even in the rainy northeastern territories of Formosa and Misiones. The horse is somewhat like the ox in his climatic requirements, but does not thrive in a rainfall of more than 55 inches in the Argentine, and therefore his northern limit is more restricted than that of the ox. Moisture is even more disadvantageous to sheep, and they do not thrive north of the line of annual precipitation of 40 inches. The strong points of the sheep are resistance to cold and hunger. The fleece enables them to endure the storms of Patagonia, and they can fast for considerable periods when necessary, and they will also paw through a foot of snow to obtain food. As a result of this hardihood, the shores of Patagonia and even of Tierra del Fuego are rapidly being taken up as sheep ranges. Many of the settlers are British subjects coming across from the Falkland Islands, where for a century they have carried on sheep-raising under somewhat similar climatic conditions, and developed a hardy breed of Falkland sheep. The flocks of Patagonia increased from 30,800 in 1881 to two million in 1895, and have had large increase since that date. Parts of interior Patagonia are high, arid, and rocky, but recent explorations have shown that, toward the foot of the Andes and south of 40° latitude, there is a promising country of lakes, forests, pastures, and fair rainfall. The climate here is said to resemble that of Scotland, which is also pre-eminently a sheep country. It is a curious fact that nearly all of the sheep of Argentina are owned or controlled by Englishmen or Scotchmen, who have brought hither their breeds of sheep and their knowledge of caring for them. The cattle industry remains in the hands of the more military Spanish and half-breed races.

* *Annales de Géographie*, p. 253.

The pastoral industry is scattered over a wide area, yet the greater part of it is concentrated near the lower course of the Paraná River.* The alluvial pastures of southern Entre Ríos and northern and northeastern Buenos Aires are the *pasto tierno* (soft annual grasses), and especially famed for producing the finest fat cattle, sheep, and wool. This district has all the advantages of fertile soil, good climate, satisfactory rainfall, and nearness to the markets. Going inland in any direction is a rapid decrease in the number of animals that can be supported per unit of area, because the pasture is harsh perennial bush grass (*pasto fuerte*, "pampas grass"), beginning at the edge of the 40-mile alluvial strip along the river. The value of this pasture has been greatly increased by the planting of alfalfa in places as far west as Victoria, in eastern Pampa. Beyond the alfalfa limit the land supports less than one sheep per acre.†

Agriculture.—The real beginnings of Argentine agriculture were in the decade 1870–80. Following the almost contemporaneous example of Kansas and Nebraska, railroads were built out into the cattle and sheep ranges, the improved reaping machinery was introduced, and agriculture on a large scale was begun. In 1883 the railroad from Buenos Aires to Mendoza was completed and a market opened for this district, which had been settled from the Pacific coast, and which had had an economic existence much like that of the Mormon settlements on Salt Lake before the opening of the Union Pacific Railway in 1869. The new outlet gave an impetus to a fruit and wine industry that now goes far to supply the wants of the country. The opening of a railway to Tucumán has produced a similar development of the sugar industry in that province. The agriculture of the western districts has been in the main only an attempt to supply food products to the home market. The agricultural exports—wheat, Indian corn, and flaxseed—are all produced in the eastern district. The census of 1895 showed that, in

* Punta Arenas, in Chilean territory on the Straits of Magellan, has already become the centre of a large meat industry, and is a regular port of call for European steamers. Even the Island of Cape Horn has been found to have water supply and pasture, and an expedition has been dispatched to establish a lighthouse there.

The Census of 1895 returns 17,614,000 cattle, 68,444,000 sheep, and 3,422,000 horses in the five eastern provinces of Buenos Aires, Entre Ríos, Córdoba, Santa Fé and Corrientes. The same census gave the total figures for the entire country as follows: Cattle, 21,690,000; sheep, 74,380,000; horses, 4,447,000. The area marked upon the accompanying map as the possible wheat area, along with a narrow strip to the north of it, contains 80 per cent. of the cattle and 95 per cent. of the sheep.

† Kaerger, p. 232.

a total wheat acreage of 5,061,000 acres, 4,915,000 acres were in the provinces of Buenos Aires, Cordoba, Entre Ríos, and Santa Fé. In 1901* the same States had $\frac{1}{2}$ of the wheat acreage and a larger share of the flax and corn.

As in the new grain-growing sections of the United States, the Argentine farming operations began on a large scale, and with no regard to methodical agriculture. The breaking up of the large estates into farms has not followed, as in this country. The Argentine agriculture is still in the plantation stage.† The farmer is the European peasant, usually Italian, who rents land as best he can, frequently on short terms, from the representatives of absentee landholders. His house is a temporary structure; he piles his grain upon the ground; he often wanders from place to place; and the methods of culture are crude and primitive. The wheat and corn acreage fluctuate from year to year, according to the crop conditions and price prospects. If wheat has done poorly and corn prices are high, corn is planted, and the reverse conditions are true. The uncertainty of Argentine grain-growing is indicated by the irregularity in acreage, product and exportation.

The irregular rainfall produces droughts and floods, and the plague of locusts has many times worked great destruction to crops, at times even threatening to annihilate agriculture in provinces north of Buenos Aires Province. Persistent effort has reduced the loss from this source.

GRAIN PRODUCTION. (From Statesman's Year Book.)

WHEAT.			MAIZE.			FLAX.	
	ACRES.	TONS. §	ACRES.	TONS.	ACRES.	TONS.	
1895-6. ‡	5,500,000	1,400,000	.....	.....	.....	.....
1896-7..	5,500,000	1,500,000	.....	.....	.....	.....
1897-8..	.....	.....	.....	.....	.....	.....
1898-9..	7,904,000	2,500,000	.....	.....	.....	.....
1899-00..	5,476,000	1,850,000	.....	1,000,000	646,000	170,000
1900-01..	8,449,372	2,871,440	.....	2,000,000	1,518,000	390,000

* Bulletin of Bureau of American Republics, October, 1901, p. 674, and Statesman's Year Book.

† Bulletin of Bureau of American Republics, August, 1901, p. 216.

‡ Two years must be given because the southern summer, the growing season, is from November to April.

§ Metric ton, 2,204 lbs., or 36.73 bushels of wheat.

GRAIN EXPORT.* (Tons.)

	WHEAT.	MAIZE.	FLAX.
1895.....	1,010,269	772,318	.....
1896.....	532,001	1,570,517	.....
1897.....	101,845	347,942	162,477
1898.....	645,161	717,105	158,954
1899.....	1,713,424	1,116,276	217,713
1900.....	1,929,676†	713,248	223,257
1901.....	904,289	1,112,290	338,828
1902.....	Est. 700,000.	.....	.....

The wheat area of the Argentine is limited by the conditions of rainfall and water supply. With the exception of southern Patagonia and certain parts of the Andes, the soil and temperature are suitable for wheat, but the rainfall is inadequate, or at the wrong season, over the greater part of this area. From 39° S. to the Bolivian boundary there is a zone near the Andes where the average annual rainfall is less than eight inches. Successful wheat-growing requires this much as a minimum, and it must fall during the growing season of winter and spring. Wheat can only grow here with irrigation.

In the north of Argentina there are districts (as in the Province of Santiago del Estero) having 28 to 32 inches of rain per year; but irrigation is necessary here also, because the heaviest rainfall is in summer, when it is unavailable for wheat. In going northward from the latitude of Buenos Aires and westward from the Paraná, the rains of summer tend more and more to predominate over the winter rains. With this distribution, wheat requires in the warmer districts a minimum of at least 40 inches per year. In the south, where the winter rains predominate and the loss from evaporation is less, 16 inches per annum will suffice for wheat. This condi-

* Figures from Statesman's Year Book, excepting those for 1901, 1902, and those for flax, which came from Bulletin of Bureau of American Republics.

† Amounting to more than 70 million bushels. Exports of wheat from the United States were as follows in million bushels:

1897.....	79
1898.....	145
1899.....	139
1900.....	102
1901.....	132

tion does not prevail south of a N.W.-S.E. line connecting Villa Mercedes and Bahia Blanca; and from Bahia Blanca southward irrigation is necessary in the seashore region also. The north, west, and south are thus debarred from wheat culture. The northeast, with rainfall of 40-75 inches, is also debarred, because the heat, combined with excess of moisture, renders the wheat liable to disease, makes the grain of bad quality, and is liable to spoil it in the harvest. The wheat district is, therefore, confined to a rough parallelogram in the eastern central part of the country, comprising all of the Province of Entre Ríos, nearly all of Buenos Aires, more than half of Santa Fé and Córdoba, and a corner of the Territory of Pampa.*

This is a splendid territory. It is nearly all level plain and unencumbered with forest, except for 60 miles in the north and some bush lands in the west. Much of it is alluvial soil, and the rest is of exceptional fertility in potash and phosphoric acid.† The area is as large as that part of Missouri beyond the Missouri River, all of Arkansas and Indian Territory, and the arable parts of Oklahoma, Kansas, and Nebraska,‡ 247,000 square miles, or 158,000,000 acres. Owing to the exceptional smoothness of the land, it is probable that 14,000,000 acres will cover the inarable part, leaving 144,000,000 acres for the plough. Assuming a three-year rotation, such as is successfully practised in the best farming districts of the United States, there will be 48,000,000 acres per year for wheat—eight times the present acreage. §

Such a system would preserve or increase the fertility of the soil, enable production to continue indefinitely, and, with the two intervening crops, probably support as many cattle and sheep as it does at present. Such methodical agriculture is as yet remote, but the extension on new lands of the present extensive system

* These boundaries (from Kaerger, p. 408-15 and 873-6) are approximate only, especially on the west. Some writers claim a larger territory in that direction, and there seems to be a tendency for rainfall to increase with cultivation.

† See analyses in Kaerger, p. 9. At the Colony of Esperanza, near Santa Fé, the same land has produced an undiminished yield of wheat for 40 years.

‡ The limit of successful agriculture in these States nearly coincides with the 100th meridian west of Greenwich.

§ It would be possible between the longitude of Buenos Ayres and San Luis and the 33rd and 37th parallels to have a wheat-field with the furrows 300 miles long and the headlands 200 miles wide, with no further incident to break its monotony than an occasional narrow streamlet and here and there the cluster of one-storied houses forming the local townships.—[From a letter from *Herbert Gibson, Esq.*, an English writer owning extensive sheep ranches in the Argentine.]

of grain-growing could produce a much greater yield for a limited period. The best of agricultural systems will not prevent the serious fluctuations resulting from the irregularities of rainfall, which occasionally flood or parch the crops, and the present stationary wheat average is not indicative of an agricultural revolution.

Maize, or Indian corn, requires for successful growth summer rains and a higher annual average than will suffice for wheat. It also survives, uninjured, the humidity that is fatal to wheat, and a hot summer is favourable to its perfection. The Argentine possesses a corn belt of large but uncertain area in the eastern part of the wheat region, and in the more humid northeast. The production is not so important or so promising as the wheat crop. The greater part of the possible corn land is covered with forest, which can only be cleared at considerable expense, and the sub-tropic and tropic climate is uninviting to settlers. The market conditions have not been satisfactory. The pork industry furnishes the most natural home market for corn, and thus far the raising of swine has made small progress.

Flax cultivation is at present rapidly on the increase. It is grown for the seed only, the yield being about the same as that of wheat, and sometimes greater. The area of cultivation is limited almost entirely to the alluvial valley of the Paraná, north of Buenos Aires.*

The agriculture of western Argentina is of an entirely different character from that of the east. Instead of herdsmen and the roving laborers of one-crop grain farming, the Andean valleys are populous with tillers of the soil who follow the more intensive methods of irrigation farming. The area that can be supplied with water is comparatively small, but is as yet far from being fully developed. The dependence upon high mountains for the water supply limits the irrigation belt to the neighbourhood of the Andes and the Mountains of Córdoba, where a second irrigation community has grown up on the east side of the north and south Sierra de Córdoba.

The building of two railroads across the Great Plains to the foot of the Andes has caused the development of two western provinces, and has given the people of Argentina a domestic supply of three commodities which had before been imported—wine, fruits, and sugar.

The planting of cane and the manufacture of sugar are confined

* Kaerger, 455.

almost exclusively to the small province of Tucuman. There are at the same time other districts with climatic conditions as well or better suited to the growth of cane. The northeastern part of the country—the territories of Formosa, Chaco, Misiones, and northern Corrientes—have a warmer summer, a suitable rainfall, and less danger of winter frost; but Tucuman has the security of irrigation, and the more wholesome climate made it one of the early districts settled, while the northeast remains almost a wilderness, with very small increase in population. In 1830 the culture of cane was begun in Tucuman; the industry has remained there, and in spite of the low percentage of sugar and the poor yield per acre,* it has increased since the opening of the railroad, and now supplies the entire country with a surplus for export. The industry would probably decline but for the protection of a favorable tariff, which the country appears willing to continue. In 1895 the acreage was 82,000; and in 1899, 120,000, with 103,000 tons of sugar. According to a calculation made in 1894, the industry employed 60,000 laborers, who had come from provinces adjacent to Tucuman, 6,000 wagons and carts, and 60,000 work animals; 500,000 tons of wood were brought from Santiago del Estero, and a considerable mileage of railroad depends upon sugar for its freight. The province of Tucuman is the most densely populated in the country,† and furnishes a market for wheat and corn from Santa Fé, alfalfa from Cordova, wine from Mendoza, and cattle from Jujuy and Salta.‡ In recent years the sugar industry has passed through a crisis due to over-production (for the home market) and the necessity of selling a surplus abroad in competition with European bounty sugar. The result has been the organization of the manufacturers, who have succeeded in controlling the prices and limiting the production nearly to the demands of the country.§

The wine industry has made an advance similar to that of sugar. The grape grows throughout the central part of the country, both east and west. The humidity and heat of parts of Buenos Aires cause disease, but the vine does well in Entre Ríos, in the south, in the new settlements on the Rio Negro, and in the west. It is

*The cane in Tucumán yields 7-8% sugar; in Mauritius, 18-19%; in Mexico, 18-19%. The sugar yield per hectare (2½ acres) is 2 tons in Tucumán, 3 tons in Natal, 4 tons in Egypt, 5 tons in Louisiana, and none of the latter countries is especially favoured for sugar production. *Annales de Géographie*, p. 255.

† In 1900 the population per square mile was 27.9 in Tucumán, 9.6 in Buenos Aires, 10.5 in Santa Fé, 11.9 in Entre Ríos, 8.5 in Corrientes.

‡ *Annales de Géographie*, p. 255.

§ *Annales de Géographie*, No. 57, p. 256.

only in the dry and stony slopes of the Andes in the provinces of Mendoza* and San Juan that wine-making is extensively carried on, and here irrigation is a necessity.

In 1895, 71,000 acres were in vines. There have been extensions since that date, and the heavy wine importations of 20 years ago have been reduced to less than 20% of their former volume, and consist of the finer grades that cannot be grown at home. Nevertheless, Argentina wine production leaves much to be desired. The wine does not have good keeping or shipping qualities. The manufacturing plants are not of the best pattern, and the lack of refrigerating apparatus makes it impossible to control the temperature and regulate the fermentation. The vines are usually of French varieties and ripen their fruit much too early, necessitating the making of wine in the period of greatest heat. These difficulties are greater in San Juan than in Mendoza, because the cooler climate in the latter lets the vines remain dormant longer in the spring.

The early ripening of the fruit can only be remedied by the introduction of new varieties adapted to the climate. It is even possible that the desired varieties may have to be developed in the country, as they were in the eastern part of the United States. Under any conditions the replacing of the old vines with new will be a slow process, as it means the loss of income for several years. The successful development of a wine export trade seems to await these improvements in varieties and refrigeration.† In the meantime the only wines imported are some of the high-priced European specialties.

The irrigated region of the west is also the scene of a rising fruit industry somewhat similar to that of California. The natural conditions for drying fruit are excellent, and some grades are already grown in quantities sufficient for the home demand. In 1895 the raisin production was 10,582 tons.

TRANSPORTATION AND POPULATION.—The extent of railroad development is one of the best indices of the development of an agricultural country. In this respect Argentina is far behind the western half of the Missouri-Mississippi Valley. This part of the United States has over 40,000 miles of railway, the whole of the

* Mendoza has 60,000 acres in vines, and produced over 26 million gallons of wine in 1901. Bulletin of Bureau of American Republics, October 1901, p. 676.

† *Annales de Géographie*, p. 257.

Argentine 10,213,* but 200 miles more than the combined mileage of the State of Kansas and the Indian Territory.

The distribution of the Argentine railways reflects the industrial development of the different parts of the country. There is something of a network in the grain-growing region of the east and in the sugar districts of Tucuman, while long lines reach across the plains to the distant western settlements. The Government encourages immigration and agriculture, and there are extensive railroad plans for the future, including three lines across the Andes; as yet the first line, from Mendoza to Santiago in Chile, requires a difficult tunnel to complete it. The Government owns 1,200 miles of unprofitable railway, and all the other lines are owned by English capitalists.

The Parana River is navigable to the northern boundary of the country and is an important commercial highway. The Rio Colorado, in the southern frontier region, has also been found to be navigable for 300 miles. The Parana is navigable for ocean steamers as far as the port of Rosario (population 112,461 in 1900). The river is deep, and vessels can load directly from the warehouses upon the shore. The location of this port near the agricultural centre is such that the city must acquire an increasing importance in the export of agricultural commodities. The shipments of this class of articles amounted to 900,000 tons in 1901.

At the southern end of the agricultural region the Bahia Blanca reaches far inland, and at its head is the port of Bahia Blanca, a railway centre now rising into commercial importance, and having a promising future as the outlet for the pastures and grain fields of the southwest. Buenos Aires, the largest city among the Latin races, is the metropolis, the greatest market, and it therefore continues to be the predominant port for imports and the leader in exports, although the harbor is naturally very shallow.

The Argentine population numbered 3,954,911 in the census of 1895; and in 1900 the estimated number was 4,749,149. The increase was general throughout the country, except in the northeastern territory of Misiones, where there was a slight decline. The city and province of Buenos Aires increased one-quarter, the province of Santa Fé one-third, the newly-opened territory of Pampa nearly doubled, and the few hundreds in Tierra del Fuego were increased four-fold. The total population equals that of

* Figures for the end of 1901. *Bulletin of Bureau of American Republics*, March, 1902, p. 571.

Kansas, Nebraska, and the part of Missouri * lying to the southwest of the Missouri River. The Argentine population is a mixture of the three Latin races of Europe, with some Indian blood, but the proportion of Caucasian is far greater than in any of the tropic countries of South America. Since wool-growing became profitable in the middle of the nineteenth century there has been a considerable European immigration, chiefly from south Europe. From 1895 to 1900, inclusive, the arrivals ranged from 84,000 to 135,000 per year; but the unsettled character of the population is shown by the returning immigrants, who numbered during the same period from 37,000 to 62,000 per year, leaving the average annual gain by immigration during the six years 55,852. In 1895, of the foreign-born population 500,000 were Italians, 200,000 Spanish, 100,000 French, 22,000 English, 15,000 Swiss, 17,000 Germans, 13,000 Austrians.

ON THE NORTH WEST PASSAGE AND THE CIRCUM-
NAVIGATION OF AMERICA.

BY

ANDREW J. STONE.

Early Arctic exploration was nearly always undertaken in the interest of commercial affairs. Scientific work, though extensively conducted, was almost always a secondary consideration; very especially was this the case in the many attempts to make the North West Passage.

Interest in the natural sciences has greatly influenced a tendency toward strictly scientific work, and most expeditions fitted out in recent years for exploration in the Arctic have made scientific work their first and most important object, and of such popular interest has this work become that it is doubtful if an expedition for any other purpose could find support.

Expeditions in the interest of science ever have been and will be largely directed by those who prosecute the work rather than by the people who support it.

Rarely, if ever, do the supporters of such work really dictate where and how it must be performed. This is easily understood when we take into consideration that such an expedition is gene-

* Estimated at 2,000,000.

rally headed by some one whose efforts have influenced support in the undertaking that he advocates and the work which he is ambitious to prosecute—often a work to which he has already devoted years of labour and study. If the theory and work as outlined inspire the confidence and sympathy of the public, and they support it, they virtually support him, believing that in so doing they support a worthy enterprise, and that in this way they assist in giving to the world a very great deal of good. The nearest approach to any general and systematic work in the interest of science yet conducted in the Arctic was in the establishing of the International Polar Stations, 1881-3.

No thorough and systematic research has ever been undertaken by any nation, people, or society for the purpose of an extended series of explorations. Thus it is that some sections are being traversed year after year, until there is not a stone left unturned; while others, large in area, rich in animal and plant life, inhabited by interesting races of people, geologically and otherwise important and entirely accessible, are completely overlooked.

In the supporting of natural science work, in the founding of great schools and other institutions of public interest, it can be said to the credit of many of our wealthiest men and women that they are building to themselves monuments that are imperishable, and that will be visible to a world, not a neighbourhood.

While the circumstances under which such work is done prohibit the possibility of systematic research in a general way, as the work of each and every expedition is generally conducted on a basis independent of that of any other, and while too many of these expeditions follow in the paths of predecessors, often influenced by an interest created by public sentiment, or, more likely, a desire to pass beyond the limits of their predecessors, yet there are those interested in such work whose independence of spirit and thought will lead them into the much-neglected regions purely for the good to be accomplished in the bringing to light new and rare material, and the final result must be the same.

I advocate the circumnavigation of North America because northern North America comprises a very great area of country, the most neglected of any in the Arctic; because it contains more of real interest to the natural sciences per square mile than any other part of the Arctic; because more and better work can be performed there for the cost than in any part of the Arctic; because there is more real new material to be gathered there than in any part of the Arctic.

To do this work would really involve the making of the North West Passage. But the one great object should be the acquisition of a vast and all-important fund of scientific data, the extent and value of which should far surpass that which it is possible to obtain now from any other part of the Arctic. The field is a great one; it is accessible; it will be worked, and through this work its advocates, supporters, and executors will be made known throughout the world.

Some of the most prominent efforts to make the North West Passage have been,

From the East:

That of John Ross and Lieut W. E. Parry, in the *Isabella* and *Alexander*, in 1818;

W. E. Parry with the *Hecla* and *Griper*, 1819-20; W. E. Parry in the *Fury*, and Capt. Geo. F. Lyon in the *Hecla*, 1821-2-3; W. E. Parry, in command of the *Hecla* and the *Fury*, 1824-5;

John Ross in the *Victory*, 1829-30-32-33; Sir Geo. Back in the *Terror*, 1836-7; Sir John Franklin, commanding the *Erebus* and *Terror*, 1845.

From the West:

That of Capt. James Cook in the *Resolution*, and Capt. Clerke in the *Discovery*, 1778; Beechey, 1826; Franklin search from the west, Capt. Richard Collinson in the *Enterprise*, Capt. Robt. McClure in the *Investigator*, 1850-1-2-3-4-5.

With the loss of the Franklin party of one hundred and twenty-nine souls ended all attempts at making the North West Passage. For fifty years all interest in the North West Passage has been smouldering, and all interest in the great stretch of coast and islands at the north of our continent, with its wealth of natural history resources, has been buried. People, like sheep, follow a leader; some day this work will be resumed, and all the nations of the civilized world will be afame with interest.

Every one of these expeditions was sent from England, and, although much good came to science through their efforts, they were prompted largely by commercial enterprise. That these expeditions should have failed in their main object is not strange.

That the circumnavigation of America can and will be accomplished is quite plain. Neither Cook nor Beechey ever reached Pt. Barrow, but the whalers, even in sailing vessels, now pass around it and far to the east every year.

The expedition that circumnavigates America and makes the North West Passage will rival the honours of the expedition that

reaches the North Pole, and would far surpass all Arctic expeditions of modern times in its scientific results.

In order to create an interest in any scientific expedition, that expedition must have a well-defined purpose, and that purpose must be one that appeals to the most intellectual and learned people.

Very little effort has ever been made by America or by Americans in the exploration of northern North America, and very little credit is due them for what knowledge we have of this great region.

I believe that an American expedition can and should do what those from Europe have failed in their attempts to do.

I believe that it is highly important that Americans should make complete investigations of the geographical and natural history resources of their own country. I believe that such an undertaking, rightly presented, would find a warm place in the hearts of the best American people, and would not be lacking in support. I favour an all-American expedition, and I would, for many reasons, favour private rather than public patronage.

The members of the expedition should be English-speaking, American-born. Men for every position, from the coal stoker up, should be selected with precise and careful consideration for their fitness for the work demanded by their position, and their capability to withstand the deprivations likely to be encountered.

The man in charge of the expedition should be a man of resources, and perfectly familiar with the physical conditions to be encountered in such a country. He should be familiar with every kind of travel in such a country. He should know what is possible to accomplish and what is not. He should be a man of experience, in the prime of life, and capable of great endurance. He should be a man capable of inspiring his party with courage, of knowing their needs, and of so managing the affairs of the expedition in general as to make possible the accomplishment of the best results from the scientific corps. He should be familiar with the country to be travelled and capable of withdrawing his party to a place of safety in case of accident, to prevent the useless loss of life that so often occurs.

He should have a knowledge of the proper foods and proper clothing and of the equipment of sledding parties and what to expect of them. He should understand how to keep his party active and know the essential features in keeping them healthy and in good spirits.

Under him should be the navigator of the ship. The navigator of the ship should be a man of strong physique, in every way a

thorough and capable navigator, and one who has had extended experience in ice navigation. He should know ice as a mathematician knows figures, and be thoroughly conversant, not only with the working of the ship through fields of ice, but with putting it into and getting it out of the winter quarters. He should have the supervision of the crew—strong, hardy young men, selected from the crews of whaling ships, accustomed to wintering in the Arctic.

Geographical, meteorological, geological, zoological, botanical, and ethnological work in all various departments of their respective branches should each be under the direction of a competent man fitted for such work, and all should be aided in extending their research by the head of the expedition.

Eskimos could be used to good advantage throughout the entire north coast.

An expedition leaving for such an undertaking should be fitted for three to five years' stay.

GEOGRAPHY AND INTERNATIONAL BOUNDARIES.

BY

ISRAEL C. RUSSELL.

The recent bitter controversy between the Argentine Republic and Chile concerning the position of the boundary between their respective territories, the long-continued contention between Great Britain and Venezuela in reference to a similar question, and the still pending discussion as to the meaning of a treaty between Great Britain and Russia, in which the position of a portion of the line of demarcation between Alaska and Canada is involved, furnish instructive lessons in reference to the importance of geographical knowledge on the part of statesmen and diplomats charged with the responsibility of framing international treaties involving the partitioning of land.

The international boundary disputes, just referred to, as is well known, are but recent examples from a long category of similar misfortunes, embracing all historic time, and not infrequently including disastrous wars, as well as heated discussions and lengthy arbitrations. The study of the history of this group of international troubles should show what the germ of the disease is, and how similar disorders may be avoided in the future.

The principles involved in large real estate transfers—for such the acquiring of a title to land by a nation may be justly termed—are fundamentally not different from those controlling the dividing of a farm among the heirs of its former owner, or the sale of a city lot by one man to another. Indeed, the legal contests and the too frequent disputes, with mutual defiance of law, between individuals in reference to property lines, have their counterpart on a larger scale and involving correspondingly greater disasters, in the boundary disputes between nations. The experience gained in the smaller dealings may reasonably be expected to furnish guiding principles for safely transacting the larger business. The most important parts of an ordinary sale of land, in addition to the payment of the stipulated price, are: a search of its title, a survey of its boundaries and the making of them on the ground, together with an accurate description of them in a deed and in many instances on a map, and the official recording of the deed and perhaps also of the map. It is to plain, straightforward real estate transfers of this nature that we hope, if we do not believe, nations are tending, and other and more complex phases of national expansion need not be considered at this time.

In the transfer of the title to land from one individual to another the services of a lawyer and of a surveyor are important, and one is as essential as the other. In the transfer of territory from one nation to another the diplomat—that is, the acute and learned state lawyer—scrutinizes the title of the territory in question from all points of view involving international laws and customs, but the services of the surveyor of broad training and wide experience, or the geographer, are much less commonly secured during either the preliminary negotiation leading up to a transfer of territory or the final drafting of a deed to it in the form of a treaty. It is a significant fact, however, that in connection with several of the lengthy disputes and arbitrations concerning treaty boundaries that have arisen, owing to a lack of geographical knowledge on the part of the diplomats who made them, extensive compilations of maps and even detailed surveys of large portions of the earth's surface have been made. Still further arguments might be presented, did space permit, to show that the co-operation of diplomats and geographers is as essential in national transfers of territory as the combined labours of lawyers and surveyors in order to secure a perfect title to land sold by one individual to another.

It is not only important that international boundaries should be

described in precise terms, accurately located, easy of identification, and capable of being re-located in case the monuments employed to mark their courses become obscured, but also highly desirable that the best geographical boundaries within the range of choice should be selected before a final interchange of treaties is made. By the best geographical boundary is meant the one which secures the most advantageous adjustment between the activities of men and natural conditions. It is in the adjustment of boundaries to physiographical conditions, as well as in the actual survey and location of them on the ground and on maps, that the geographer may be of service to the state. The history of boundary disputes indicates only too clearly that the negotiations between nations respecting the transfer of territory from one flag to another have in many instances been entrusted to diplomats solely, and geographers not consulted. The dividing lines between nations have not infrequently been described in a few general paragraphs at Ghent, Paris, or Washington by diplomats who, so far as can be judged from the treaties they signed, had but slight knowledge of the geography and resources of the lands through which the boundaries were to run, made no attempt to select the best from the several lines that might have been considered, were not influenced by a desire to adjust the proposed boundary to natural conditions in such a way as to secure the maximum advantages to commerce, etc., of the nations immediately concerned, and gave no heed to the relative merits of the several classes into which boundary lines may be divided.

The first step in an endeavour so to adjust boundary lines to physiographical and political conditions, that the least detriment to the abutting nations shall result, is to classify boundaries and study the merits of the several groups into which they naturally fall.

The boundaries between nations, states, provinces, etc., established in various ways, may be classified, at least provisionally, in six groups. We may term these groups *coast boundaries*, *astronomical boundaries*, *water boundaries*, *mountain boundaries*, *divide boundaries*, and *arbitrary boundaries*.

Coast Boundaries.—The junction of the sea and land on the borders of continents and islands furnishes natural and clearly-defined lines, which are evidently the most desirable of any of the various classes of boundaries for defining political limits. By international consent the jurisdiction of a country bordering on the "high

"seas" is a line one marine league seaward from the margin of the land, and following its meanders. As an international dividing line the one league limit seldom, if ever, becomes important, since the nice adjustment of the width of an arm of the sea necessary for such a purpose rarely occurs. When an extension of the ocean's waters, intervening between two nations, is less than two marine leagues wide the boundary between them commonly follows its medial line, and has all the essential features of a water boundary, described below.

Astronomical Boundaries.—The shape of the earth and its motions in reference to the sun are such that certain imaginary lines on its surface may be located with precision by astronomers, and if the monuments or other marks employed to show the positions of such lines are removed they can be accurately re-located. The lines referred to are principally parallels of latitude and meridians of longitude, and boundaries, so far as they coincide with these lines, may for convenience be classed as astronomical boundaries.

Examples of the class of boundaries here indicated are furnished by the one defining the east border of the main body of Alaska, which, as defined in a treaty made in 1825 between Great Britain and Russia, is the 141st meridian west of Greenwich; and by the boundary between Canada and the continental portion of the United States from near the Lake of the Woods westward to the coast of the continent, which, as finally decided in a treaty between Great Britain and the United States in 1846, is the 49th parallel of north latitude. The boundaries of a number of the States of the United States, and of several of the Provinces of Canada, are either wholly or in part parallels of latitude or meridians of longitude, and furnish good examples of what are here termed astronomical boundaries.

The most conspicuous advantages of astronomical boundaries are that they may be accurately described without a knowledge of the country through which they pass. They can be located with precision and their courses accurately marked by monuments. For these reasons astronomical boundaries, when clearly defined in treaties between nations or in laws concerning the territorial limits of states or provinces, leave no room for contention as to their positions.

The leading objections to the use of astronomical boundaries, particularly as international dividing lines, are: The temptation they offer to diplomats and others, who may be interested in the

speedy conclusion of a treaty, to make hasty divisions of territory without knowing its resources or commercial and other possibilities. Then, too, such boundaries cross the land without reference to its topography, and have no essential relations to the courses of streams or the directions of coast lines, etc. They may divide a fruitful valley in a most arbitrary and inconvenient manner between two nations with widely-different laws and customs, or cross a navigable river at several localities, and intersect a coast or lake shore so as to initiate complex conditions in respect to harbors, navigation, customs duties, etc. In these and still other ways boundaries coinciding with lines of latitude and longitude are apt to bring about detrimental commercial and other relations between adjacent nations, states, and provinces. A region which is an industrial unit—as the gold fields of the Klondike district, the iron-bearing tracts to the west of Lake Superior, the wheat lands of the Red River valley, the forested lands of the North West coast, etc.—when divided between two or more countries with different laws, is deprived of the advantages that should follow from the natural course of industrial development, and one part or the other suffers in consequence.

Again, until an astronomical boundary is surveyed and marked on the ground by skilled geodesists, it cannot be located even approximately by miners, trappers, foresters, and others, and many difficulties are apt to arise in this connection.

Although an astronomical boundary once decided on and formally recorded in a treaty leaves no excuse for national quarrels as to its position, it is evident that its far-reaching and perhaps highly-complex influences on the development of neighbouring peoples are likely to be such that the natural resources, conditions affecting transportation, etc., of the region through which it passes should be thoroughly understood before a final decision is reached.

Water Boundaries.—In numerous instances the medial line or one shore of a stream, lake, estuary, strait, or other water body not recognized as a part of the "high seas" has been selected to serve as a fence between nations and states; collectively, such dividing lines, typically represented by a river without islands, flowing between well-defined and permanent banks, may conveniently be termed water boundaries. In general, when a stream, lake, etc., is a national or state boundary, its medial line, or the centre of the main channel when there is more than one, is defined as the precise line of demarcation.

The leading features of water boundaries are illustrated by a portion of the line separating the United States from Canada, which traverses the middle of the St. Lawrence River, and divides medially several of the Great Lakes and their connecting streams. The south boundary of the United States is also in part a water boundary, and is defined by treaty as "the middle line of the Rio Grande, or its deepest channel where there is more than one."

In certain instances, when a river, lake, bay, etc., separates two political organizations, one shore or the other may be defined by treaty or by law as the actual line of separation, and even complex relations may exist, in reference to jurisdiction over the dividing waters. The water boundary between New York and New Jersey, for example, is, in part, the middle line of the Hudson and of New York Bay, etc., with several qualifications, including exclusive jurisdiction by New York over the waters of the Hudson to the west of Manhattan Island to the low water line on the New Jersey shore, subject, however, to certain rights of property and of jurisdiction of the State of New Jersey, etc. The waters of Delaware River are by agreement between New Jersey and Pennsylvania a common highway, over which each State "shall enjoy and exercise a concurrent jurisdiction within and upon the water, and not upon the dry land between the shores of said river"; the islands in the river being specifically assigned to the one or the other State.

The advantages of a water boundary are suggested by the fact that in most instances they may be easily located, even by persons inexperienced in the method of surveying. Coinciding, as they generally do, with definite geographical divisions, they do not lead in a conspicuous manner to complications in the industrial development of the countries or states separated by them.

The difficulties to which water boundaries may give rise are indicated by the fact that streams, more particularly than the other water bodies in question, frequently divide so as to enclose islands, and in certain instances on nearing the sea send off, perhaps, several distributaries, which discharge through independent mouths. When a stream divides so as to enclose an island, even if the main or the deeper channel is specified by treaty or by law, as the one chosen as a boundary, the question as to which of two channels is really the larger or the deeper may not permit of definite answer. Streams are subject to many changes, and what is the main channel

* Henry Gannett. *Boundaries of the United States and of the several States and Territories.* U. S. Geological Survey, Bulletin No. 171, second edition, Washington, 1900.

one year may become of secondary rank the next year, or a river, as not infrequently happens, may shift its course bodily, and thus furnish grounds for contention as to the ownership of the territory transferred from one of its banks to the other. The distributaries of streams, or the separate channels into which they divide on deltas, etc., are also subject to conspicuous and sometimes sudden changes. Who could decide, for instance, which is the main channel of such rivers as the Mississippi, the Nile, or the Ganges, in the delta portions of their courses; or if a choice seemed practicable, is there any assurance that the distributary, largest to-day, will maintain its supremacy for a decade to come, or even be in existence a century hence?

The controversies that may arise in reference to which of two channels in a designated water-body is the main one, are illustrated by the well-known "San Juan episode," which came near bringing on hostilities between Great Britain and the United States in reference to the ownership of certain islands in the Strait of Georgia; the immediate subject of contention being whether "the channel which separates the continent from Vancouver's Island," as the statement reads in the Webster-Ashburton treaty, 1846, passes to the east or to the west of the San Juan Islands. The Emperor of Germany, as is well known, acting as arbitrator, decided that the islands belong to the United States. Thus, in 1872, a series of disputes as to the Canadian-United States boundary, which had been carried on for ninety years, was closed.

While water boundaries and especially rivers, in certain instances, have furnished almost ideal dividing lines between nations, in other instances they have proved to be objectionable. The difference lies in the nature of the streams themselves, and illustrates the fact that, with water boundaries as with other classes of dividing lines between nations, a critical knowledge of the geography of the region through which they pass is a pre-requisite of treaty-making, if subsequent boundary disputes are to be avoided.

Mountain Boundaries.—The crests of mountain ranges, or mountain chains, are sometimes specified in treaties as defining territorial limits. The ideal mountain range is one having a generally straight alignment and a continuous and sharply-defined crest, but in nature this ideal is seldom attained. Modern geographical studies have shown that many so-called mountains, which from a distance appear to be well-defined uplifts with sharp crest-lines,

are in reality broad plateaus or great domes, deeply dissected by stream erosion. In such instances it is frequently difficult to decide where the crest of the range is located. Indeed, as is not infrequently the case, there is no definite and tangible crest-line. Although it is sometimes assumed that the crest-line coincides with the water parting, or the divide, between the head-branches of streams flowing in opposite directions from a mountain-like uplift, it is well known that a mountain range, even when bold and sharply defined, may not be a divide for the principal streams of the region where it is situated. An illustration in point is furnished by the Appalachian Mountains, through which the Susquehanna, Delaware, and other important rivers rising in the plateau to the west flow transversely in deep valleys and empty into the Atlantic.

The recent controversy between Argentina and Chile was due to an assumption in a treaty between them that the crest-line of the Southern Andes coincides with the water-parting between the streams flowing to the Atlantic and those discharging into the Pacific. Post-treaty surveys, as they may suggestively be termed, have shown that in the portion of the Andes in question streams rising well to the east of the mountains flow westward through them in deep transverse cañons, and that there is a wide discrepancy between the continental water-parting and the topographic crest-line of the continent.

A mountain boundary, if defined as the line along which the upward slopes on the opposite sides of a prominent uplift meet in its summit portion, would in most instances be irregular and perhaps conspicuously intricate, for the reason that mountain crests are modified and shaped by erosion and migrate in one direction or another according to the strength and other qualifying conditions of the opposite-flowing streams. Then, too, an uplift which seems to a casual observer to be a single mountain range may, in reality, be highly complex, and no continuous crest-line be discoverable. In short, the sweeping statements sometimes embodied in treaties, to the effect that the line of demarcation between contiguous countries shall be the crest-line of a certain indicated mountain range are fraught with uncertainties and difficulties, which are likely to prove a source of discontent and costly arbitration, or even lead to war.

Divide Boundaries.—A boundary which is defined as following a specified water-parting or divide, from which streams flow in opposite directions, would in most instances be easily traceable on the ground even by persons unskilled in the art of surveying, and

for this and other reasons has much to commend it; yet, without an accurate knowledge and, most of all, an accurate topographic map of the region through which such a boundary is to pass, its selection on general principles, however nicely worded, is open to dangers of the same nature as those pertaining to a similar choice of a mountain boundary.

In arid regions broad plateaus may form divides, and even an approximate location of the line of water-parting, if one exists, be a matter of difficulty and uncertainty. Then, too, the process of head-water corrosion pertaining to essentially all streams, and of stream capture, or the acquiring by one stream, through the process of stream development, of the territory formerly drained by its neighbour, leads to a migration and sometimes a sudden and perhaps extensive shifting of a water-parting.

Examples of divide boundaries are furnished by the one separating Idaho and Montana, which in part coincides with the continental divide, and serves its purpose well; but the satisfaction it has given is to be qualified by the fact that, for the most part, it is situated in a rugged region, where there is but slight probability of the property interests of the communities parted by it coming into direct contact.

Boundaries which are made to coincide with the courses of rivers, with the crest lines of mountains, or with water-partings, have certain commendable features in common; they are easily located, readily defined by natural features of the earth's surface, and in general do not require to be accurately surveyed and marked by monuments before they serve their purpose as international or inter-state fences.

Arbitrary Boundaries.—A class of boundaries not otherwise readily definable may be conveniently designated as arbitrary boundaries, since, as a rule, they are not described in terms such as pertain to astronomical boundaries, and bear no necessary relation to topographic or other features of the regions they traverse. Like astronomical boundaries, the ones here considered are imaginary lines, and, in part, might with propriety be included in that class, since they are capable of being located by astronomical methods; but they serve our purpose better if considered in a group by themselves. The class of boundaries here referred to includes straight lines connecting two points; lines defined as running in a given direction (azimuth) and for certain distances; arcs of circles; tangents to circles, etc. In brief, arbitrary boundaries may be de-

fined as straight or curved lines or combinations of such lines, and are similar to the lines employed by surveyors in marking the boundaries of a farm, locating a railroad, etc.

An example of what is meant by an arbitrary boundary is furnished by the line separating Delaware from Pennsylvania, which is an arc of a circle twelve miles in radius, with the steeple of the old court-house in Newcastle, Delaware, as a centre. Again, in the establishment of the District of Columbia, a rectangle ten miles square was chosen and marked on the ground by means of monuments as the site of the capital of the United States. Another illustration is furnished by the eastern boundary of California, as defined in its constitution. This boundary runs from the intersection of 120 degrees of west longitude with the 39th degree of north latitude, in a straight line in a southeasterly direction to the River Colorado, at a point where it intersects the 35th degree of north latitude.

Boundaries of the nature just cited can only be recognized when actually marked on the ground, and except in the case of straight lines, not of great length, or small geometrical figures, are difficult of precise location, even by skilled surveyors. Should the monuments used to define their positions be destroyed, their replacement is an arduous task.

Impracticable Boundaries.—There are certain dividing lines which are defined in treaties, decrees, etc., as running parallel to some natural feature, as a coast or a river, and at a given distance from it, that might with propriety be classed as arbitrary boundaries, since no effort is made to adjust them to the natural conditions of the immediate territory they traverse; but, for the purpose of expressing a still greater weakness inherent in them, they are here specially designated as *impracticable boundaries*. This, as is to be hoped, temporary class of boundaries includes the proposed lines of demarcation sometimes inserted in treaties, etc., which it is impossible, or at least impracticable, without great and, for the most part, useless expense of time and money, to mark on the ground, and thus seek to make serviceable.

In this connection reference may be made to the boundary between southeastern Alaska and Canada, which, as stated in the treaty between Great Britain and Russia previously referred to, in the absence of a mountain range parallel with the coast and not over ten marine leagues inland—and as subsequent explorations and surveys have shown such is the case—"shall be formed by a

line parallel to the windings of the coast, and which shall never exceed the distance of ten marine leagues therefrom." The region through which the line described would pass, if surveyed, was almost entirely unknown at the time the treaty referred to was made, but, as has since been discovered, it is exceedingly rugged, and contains many mountains, ranging from 10,000 to 18,000 feet high, besides a multitude of glaciers and many extensive fields of perpetual snow. To survey and mark on the ground the boundary indicated in the treaty would be what may be justly termed an impossible task; and, besides, if the line as defined by treaty should be established, it would be intricate, and much less serviceable as a national fence than any one of several possible boundaries that could have been chosen, with essentially the same end in view, at the time the original treaty was entered into, had a geographer been employed to make even a hasty reconnaissance of the region in question.

Another example of a boundary being defined as running parallel to and at a specified distance from an irregular geographical feature, is furnished by a part of the boundary between Massachusetts and New Hampshire, which is a line parallel to Merrimac River, and distant from it three miles on the north. In this case, although the distance of the line designated from the one to which it is to be drawn parallel is but three miles, and the country between only mildly undulating or hilly, the boundary as now marked on the ground and accepted as an interstate boundary, is but a rude approximation to the one originally defined.

These examples, and others that might with propriety be classified as impracticable boundaries, illustrate again the desirability of accurate geographical knowledge, and still more of an adequate appreciation of the difficulties and limitations met with by the surveyor, on the part of those who attend to the real estate business of nations.

The reader will perhaps ask, now that we have something of the relative merits of the various classes of boundary lines before us, which class is best and what kind of a boundary should be chosen in case new treaties involving a transfer of territory from one nation to another become necessary. The reply is, that such a choice must be determined by the conditions met with in individual cases, the prime requisite being an accurate knowledge of the geography, natural resources, and commercial advantages of the territory to be divided. These data should be in the hands of the

agents of the nations participating in the transaction, and, to a great extent, can best be presented on topographic maps.

While it is not to be expected that the entire earth can be subdivided among nations on strictly geographical principles, making each international boundary coincide with a strongly pronounced topographic feature, and assigning to each political division a definite geographical unit, as, for example, an entire continent, or island, or a definite river system, or drainage slope; yet, in many instances, as the history of boundaries shows, there have been opportunities to make at least some adjustment of political to natural divisions, and other opportunities in the same direction will, no doubt, recur in the future. In locating a railroad or other similar task preliminary surveys of several possible lines are usually made, and their relative advantages compared, before a final route is chosen; logically, it is still more important that an international boundary should represent the net result of several trial surveys, in order that the best possible line under the prescribed political and social limitations in each case may be discovered. If circumstances dictate that an international boundary is to be agreed upon, which intersects a new country, of which no reliable maps are available and trial surveys are debarred, it is plainly apparent, from the relative merits of the various classes of boundary lines, that either an astronomical or an arbitrary boundary, or a combination of the two, should be chosen, if all danger of future broils is to be avoided. Under the conditions referred to, it is apparent that a purely astronomical boundary will best serve the desired purpose. With an accurate topographical map of a region which is to be divided, in hand, trial surveys can be made on it as well in many ways, as if they were actually traced on the ground; but, in addition, the geological and other resources of the region need to be known. With all of this essential information available, the final choice of a definite boundary would be regulated by a large number of local conditions, and a composite boundary, adjusted throughout to natural conditions, would probably be found to serve the desired end most efficiently.

The services of geographers in connection with boundary treaties, pertaining particularly to new regions of the earth, should not be considered simply as a means of perfecting titles and of removing grounds for future disputes, highly desirable as such aims manifestly are, but in order that the best possible adjustment of natural resources, avenues of interior communication, and accessibility to the ocean highways of commerce may be secured to each

of the parts into which a given territory is divided. A just and reasonable adjustment of boundaries involves something more than the consideration of square miles of territory, since the intellectual and commercial development, not only of the adjacent nations but of all mankind for perhaps many centuries, is involved therein. It may perhaps be urged in opposition to this imperfectly stated, but, as is intended, broad and fraternal view of international relations, that the greed of nations for territory renders the services of the geographer unnecessary to the framers of treaties, except so far as they remove grounds for dispute—and perhaps not even then, since an aggressive nation may design to involve its neighbours in fresh controversies. Admitting that greed is the controlling principle in international transactions, and will no doubt continue to be so until the earth has been rendered uninhabitable by reason thereof, it is still just to claim that the more fully the participants in a struggle for territory are mutually informed in reference to its present and future values, the more nearly will a reasonable adjustment of its boundaries to natural conditions be secured.

HYDROLOGIC AND HYDROGRAPHIC SURVEYS OF THE UNITED STATES.

As a result of the creation of the new reclamation service under the United States Geological Survey to construct canals, reservoirs, and affiliated works for the irrigation of the public lands of the arid regions of the West, the hydrographic branch of that bureau has been reorganized. As constituted it consists of three principal divisions—namely, hydrography, hydrology, and reclamation surveys, all under the chief engineer, Mr. Frederick Haynes Newell. In bringing about this reorganization the words *hydrography* and *hydrology* have received a special and more limited meaning. Like geography and geology (the latter of which is a special outgrowth of the former, and has to do with the underground geography of the earth's surface), so the name hydrology has been adopted as implying a study of the underground water resources, as distinguished from hydrography, which term is limited to apply to the surface water supplies and sources.

The hydrographic division of the Geological Survey is devoting

its energies to the measurement of the discharge of the various streams of the country, and to a study of the rainfall on the drainage basins of these streams and of their areas, with a view to ascertaining their probable maxima, minima, and average discharge. In the western or arid regions the results of this work will be of immediate use to the engineers having charge of the planning of the Government irrigation works, and in consequence the supervision of the hydrographic work is in most instances vested in the reclamation engineers. In the Eastern States the results of this study are of immediate value to cities seeking additional water supply and to mill owners and others looking for water power. The investigations are accordingly placed under a number of local or resident hydrographers, and are administered from the central office in Washington.

The new division of hydrology has two separate sections. In the western, extensive investigations are being conducted to ascertain the possibilities of developing underground waters for use in irrigation. This investigation includes a careful study of the geologic structure of the regions under examination from which to obtain the basis for prediction of the location and quantity of subsurface water supplies. Among other purposes, this investigation is expected to indicate where experimental wells, which are provided for under the Reclamation Act, may be sunk. Some sites for such wells have already been selected. Deep wells may be bored for artesian supplies, and galleries or tunnels mined into the water-bearing gravel of the dry streams. In the eastern section similar investigations are being carried on with a view to developing underground water supplies, chiefly for the purpose of domestic and city water supply.

In view of the nature of the investigations to be made, the work has been placed under the immediate supervision and control of geologists; the eastern section under Mr. M. Fuller, and the western under Mr. N. H. Darton.

The eastern section has been divided into about 25 districts, locally managed, in large part, through co-operation with State or college geologists. At present the more important work in hand includes the collection of records of wells, including the amount of water supplied per unit of exposed area for open wells, and for drilled wells, their depth, and the nature of the formations bored. It is expected that the results will throw some light upon the occurrence of underground water, and the possible prediction of its existence in localities in which it is not now known.

In Maine this work is in progress under Prof. W. S. Bayley, of Colby University, chiefly with a view to determining the means of providing water for the summer resort islands. In New Hampshire Mr. Boutwell is conducting examinations with the same purpose in view, as are also Prof. Perkins, State Geologist, in Vermont, Prof. Crosby in Massachusetts and Rhode Island, and Mr. Gregory in Connecticut.

On Long Island more detailed investigations are in progress. These will be very complete, and will include systematic study of the geology and water resources of the entire island. The geologic investigations are under the direction of Mr. Fuller himself, and of Professor Hallock of Columbia University. Under the direction of Mr. Veatch about 1,000 borings will be made in co-operation with the Commission for Additional Water Supply for New York City, and samples of the borings will be recorded for every foot sunk. These will be carefully studied with a view to determining velocity, rate of flow, capillarity, and other physical properties. Professor Slichter of Madison, Wis., who has recently achieved such prominence through the skill which he has displayed in studying the theory and occurrence of underground water supplies, will make measures of the sub-surface flow of water between various wells with the aid of his electrical bridge.

In connection with these investigations the topographic branch of the United States Geological Survey, in co-operation with the State Engineer and Surveyor of New York, has just placed in the field a large force of surveyors under the general direction of Mr. H. M. Wilson, Geographer in charge, who proposes to complete the mapping of the remaining eastern half of Long Island. The resulting work will be published on seven atlas sheets, named: Moriches, River Head, Shelter Island, Sag Harbor, Gardiner Island, East Hampton, and Montauk Point. The force consists of two topographers, several levelmen, and a number of traversemen and field assistants. The whole area to be mapped is approximately 700 square miles, and upon the completion of this survey a small-scale wall map, about 2 miles to 1 inch and with contours of 20 feet interval, will be prepared and published, covering the whole island in one map sheet. This will furnish the basis upon which to complete the investigations of the geology and of the water supply, and will conclude one of the most thorough and systematic studies of the natural resources of a region made in any portion of the United States.

Elsewhere in the east investigations are in progress all along

the Atlantic coastal plain from New Jersey to Texas with a view to developing additional sub-surface sources of water supply. Finally, active field work is in progress in Missouri, Arkansas, Iowa, and Wisconsin. The eastern section of the hydrologic survey has already in preparation co-operative reports of the underground water resources of New Jersey by Mr. Knapp, of Georgia by Assistant State Geologist McCallie, of Alabama by State Geologist E. A. Smith, and of Nebraska by State Geologist Harris.

The western section of hydrology is equally active. In the neighbourhood of Mesa, Arizona, in the Salt River valley, investigations are being conducted by Mr. Lee in co-operation with the engineers of the reclamation service, who plan to add to the sub-surface water supplies. These investigations point to the possibility of increasing the water supply in the region for which water is most precious by the sinking of wells in the deep valley gravels. The efforts to pump some of the existing wells have shown their capacity to be far beyond what had been anticipated, and considerable areas are now under irrigation from steam-pumped wells. In Texas, investigations are in progress with a view to extending the important new artesian water basin recently developed along the coastal plain. In South Dakota, Professor Todd is adding to the information already possessed of the artesian water supplies in the James River valley. In North Dakota, Professor Williard, of the State Agricultural College, is conducting similar work. In Southern California, examination into the underground water supplies, particularly in the neighbourhood of Los Angeles, is being conducted under the direction of Mr. Lippincott, of the reclamation service. In Oregon Mr. Landis, and in Nebraska State Geologist Barber, are directing compilation of data and records of sunk and driven wells.

This section of the hydrologic survey has already in preparation reports of the geology and underground water prospects of the central plains region by N. H. Darton; also special reports on southeastern South Dakota by Professor Todd; on northeastern North Dakota by the late C. M. Hall, and on central New Mexico and Arizona by Mr. Darton.

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COMPARISON OF DISTANCES BY THE Isthmian CANAL AND OTHER ROUTES.

BY

EMORY R. JOHNSON.

In determining what commerce would use an isthmian canal, the fact of most fundamental importance is the effect which the new waterway will have on the ocean distances between the trade centres adjacent to the Atlantic, and those in and about the Pacific. The length of the route determines the time of the voyage, and, in general, the commerce of the world is so conducted as to minimize distances as much as the conditions of ocean navigation and international exchanges permit. Accordingly, a discussion of the traffic of an isthmian canal should be preceded by a comparison of the distances between the Atlantic and Pacific, by way of the American isthmus, with those by way of the various routes now followed. This comparison can best be made by means of a series of tables,* giving the distances by alternative routes between the most important commercial centres. In most respects the tables are self-interpretative. The distances are expressed in nautical miles, and the figures used in compiling the tables were furnished by the United States Hydrographic Office. The length of each canal is reckoned in nautical miles, the Nicaragua Canal being 161 nautical miles long, the Panama 41, and the Suez 88.

In the first table a comparison is made between the distances by the Nicaragua Canal with those by the Straits of Magellan between the Atlantic and Gulf seaboard of the United States and the west coast of North, Central, and South America. This table compares the distances by way of the Nicaragua Canal with those through the Straits of Magellan, from the chief ports of our Atlantic and Gulf seaboard, extending from Portland and Galveston to thirteen representative ports on the west coast of the American continents. Coronel, the most southerly of the west coast ports mentioned in the table, is situated within two or three hundred miles of the southern limits of the industrial section of Chile. It is also an important coaling port at the present time. It will be observed that the distance from New York to Coronel, by way of the Nicaragua Canal, is 3,069 miles less than the present route through the Straits of Magellan.

* Tables I-VIII on pages 169-176.

The effect of an isthmian canal upon the length of ocean routes, connecting our Eastern seaboard with the west coast of the three Americas, is well shown by comparing the distances by way of the Nicaragua Canal and the Straits of Magellan from New York, the largest Atlantic port, and from New Orleans, the largest Gulf port, to San Francisco, the representative west coast city of the United States; to Iquique, the centre of the nitrate of soda section; and to Coronel, in southern Chile. This comparison is shown in the following table:

	NEW YORK.		NEW ORLEANS.	
	VIA NICARAGUA.	VIA MAGELLAN.	VIA NICARAGUA.	VIA MAGELLAN.
San Francisco.....	4,921	13,714	4,118	14,114
Iquique	4,393	9,221	3,590	9,621
Coronel	5,161	8,230	4,358	8,360

In Table II the distances from representative European ports to the west coast of the American continents by the Nicaragua and Magellan routes are given.

The European ports included in Table II are so situated that the distances from them to Pacific ports typify the distances from the leading industrial and commercial centres of Europe. It will be observed that the distance from Liverpool to Coronel, by way of the Nicaragua Canal, will be 709 miles less than by the route through the Straits of Magellan. The route to the nitrate port of Iquique will be shortened 2,468 miles. San Francisco will be brought 6,433 miles nearer to Liverpool, and 5,780 miles nearer to Gibraltar.

In Tables III, IV and V the distances from the Atlantic American ports to Pacific countries, by way of a Nicaragua Canal and by way of existing routes, are compared.

In Table III the distances from representative ports of the Atlantic and Gulf to Yokohama, Shanghai, and Hong Kong by way of the various alternative routes are given. The distances given in the table are those which a vessel would take in going by actual commercial routes. It has been deemed more important to deal with distances by commercial routes rather than by the shortest possible course. The shortest route from the American isthmus to Japan or China is by way of the Great Circle. The distance from Brito to Yokohama direct is 7,122; via Magdalena Bay, Lower California, 7,144; via San Francisco, 7,236; and via Hono-

lulu, 7,610. By the Great Circle route a vessel can call at San Francisco by adding only 114 miles to its voyage; and with this call at San Francisco included, the distance from New York to Shanghai by the Great Circle and Yokohama is 374 miles less than via Honolulu and Yokohama. The Nicaragua route is shorter than the Suez route for all Asiatic points mentioned in the table, the advantages of the Nicaragua route being greater for our Gulf ports than for those on the Atlantic. Especial note may be made of the fact that the distance to Hong Kong by way of Honolulu, Guam, and Manila is considerably greater than by a route which enables a vessel to call en route at San Francisco, Yokohama, and Shanghai. The latter route is 536 miles less for a vessel starting from New York.

In order to compare the distances by various routes connecting our eastern seaboard with Manila, Table IV has been prepared.

It will be seen in the table that the distance from New York to Manila by way of San Francisco, the Great Circle and Yokohama is 11,207 miles, and that the distance by way of Honolulu and Guam is 11,274 miles. The Suez route is longer than either of these routes, being 11,601 miles. A vessel bound from New York or New Orleans, or any other Eastern seaport to Manila, can call at San Francisco, Yokohama, and Hong Kong en route by adding 720 miles to the length of a voyage by way of Honolulu and Guam. Manila, it will also be noticed, is somewhat nearer the eastern part of the United States by way of the Nicaragua Canal than by way of Suez.

The manner in which the Nicaragua Canal would affect the distances between our eastern seaboard and Australia is shown by Table V.

The distance from New York to Australia by the Cape of Good Hope is practically the same as by the Suez Canal, and the Cape route has the advantage of more favourable winds and currents and of a cooler temperature. Vessels going from our eastern coast to Australia always round the Cape; accordingly, the comparisons of Table V are between the Nicaragua and Good Hope routes. Steamers bound for Australia via the Cape usually call at St. Vincent for coal; hence the distances given in the table include a call at that island. The route between the American isthmus and Australia and New Zealand is by way of the centrally-located Island of Tahiti, which may become an important coaling station upon the opening of the Isthmian Canal.

New York is 3,982 miles nearer Sydney by way of Brito and

Tahiti than via St. Vincent, Good Hope, Adelaide, and Melbourne. Adelaide is 1,816* miles nearer New York, and 3,587 miles nearer New Orleans hy Brito and Tahiti than by Good Hope. Wellington will be brought 5,617† miles nearer New York by a Nicaragua Canal.

In Table VI the distances from Liverpool to Australasia and the Orient by way of the Nicaragua and Suez routes are contrasted.

With the exception of Wellington, the Pacific ports named in Table VI are nearer Liverpool via the Suez Canal than by way of Nicaragua. From Liverpool to Sydney, however, the distance via Brito and Tahiti is only 172 miles more than via Suez, Colombo, Adelaide, and Melbourne. Yokohama is but 547 miles farther from Liverpool via Brito and San Francisco than via the easterly route.

The route from Liverpool to Japan and China by way of the American isthmus passes close to both the Atlantic and Pacific seabards of the United States. A vessel would add but 323 miles to the length of the voyage from Liverpool to Greytown by calling at New York city, the port ordinarily having the largest foreign commerce of any city in the world, and an export traffic going in all directions. By calling at the South Atlantic or Gulf ports of the United States, the raw and manufactured cotton which is exported in large quantities from the United States across the Pacific could be added to the vessel's cargo. A call at San Francisco or some other west coast port of the United States would enable the vessel to participate in the grain and lumber trade from the United States to Oriental countries. If the vessel making the trip from Liverpool to Asia is sailed under the American flag, it can participate in the coasting trade between the two seabards of the United States.

The line connecting the places equidistant from Liverpool by way of the Nicaragua and Suez routes passes between New Zealand and Australia, runs east of the main island of Japan, and touches the continent of Asia on the Manchurian coast, some distance north of Vladivostok. As far as distance alone is determinative, the commerce of Liverpool with Australia and the Far East is tributary to the Suez route; but the commercial factors other than distance will, in all probability, so affect the routes of trade as to

* Omitting stop at Tahiti would add 52 miles to this figure; and if Melbourne were reached by Wellington rather than by Sydney it should be increased by 232 miles.

† Omitting stop at Tahiti would add 185 miles to this figure.

cause some of the outbound and inbound trade of Liverpool with the East to make use of the westerly route.

For the purpose of showing the relative advantages, as far as distance is concerned, which New York and Liverpool will possess for the Eastern trade after the isthmian canal has been completed, Table VII has been prepared.

New York will be nearer than Liverpool to New Zealand and the commercially important half of Australia. Liverpool, by way of the Suez route, will be nearer than New York by way of the Nicaragua route to the Philippines, Hong Kong, and Southern Asia. Shanghai will be almost the same distance from New York as from Liverpool. The advantage in favour of New York by way of Brito, San Francisco, the Great Circle, and Yokohama being 83 miles, the route from Liverpool by way of the Suez, including a call at Colombo, Singapore, and Hong Kong, Northern China, Manchuria, and Japan, will be considerably nearer New York than to Liverpool.

The line connecting the points equally distant from Liverpool and New York by the Suez and Nicaragua routes respectively, runs through the central part of Australia, through the western part of New Guinea, east of the Philippine Islands, and touches the mainland of Asia a little north of Shanghai.

Tables I-VII show the effect which a Nicaragua Canal would have upon the ocean distances from our eastern seaboard to the Pacific countries of America, Australia, and Asia. These tables also show the manner in which the comparative distances from our eastern seaboard and from Europe would be modified by a Nicaragua Canal. In Table VIII the Nicaragua and Panama Canal routes are contrasted, and the distances from typical Atlantic and Gulf ports of the United States and from representative European cities to the western coast of the American continents and to trans-Pacific countries by way of each canal route are given.

Table VIII shows very clearly that the Panama route is the more advantageous for the West South American trade, both with Europe and the United States. For the commerce of Europe and the United States with every other Pacific country, with the exception of New Zealand, to which the distances are practically equal, the Nicaragua is shorter than the Panama route. If the call be made at Tahiti on the voyage between Wellington and the American isthmus, the Nicaragua route is somewhat shorter than the one across Panama for the trade of North Atlantic countries with

New Zealand. If this voyage be made without the call at Tahiti, distance by way of the two canal routes is practically the same.

For convenience of comparison the following brief table is serviceable. The distances from New York, New Orleans, and Liverpool by way of the Nicaragua and Panama canal routes to San Francisco, Yokohama, Hong Kong, Sydney, Wellington, and Iquique are shown:

DISTANCES FROM NEW YORK, NEW ORLEANS AND LIVERPOOL
VIA NICARAGUA AND PANAMA TO PACIFIC PORTS.

	NEW YORK.		NEW ORLEANS.		LIVERPOOL.	
	NICARAGUA.	PANAMA.	NICARAGUA.	PANAMA.	NICARAGUA.	PANAMA.
San Francisco.....	4,921	5,299	4,118	4,698	7,651	8,038
Yokohama	9,457	9,835	8,654	9,234	12,187	12,574
Hong Kong.....	11,366	11,744	10,563	11,143	14,096	14,483
Sydney via Tahiti.....	9,676	9,852	8,873	9,251	12,406	12,591
Wellington via Tahiti.....	8,716	8,892	7,913	8,291	11,446	11,631
Iquique.....	4,393	4,021	3,590	3,420	7,123	6,670

I.—DISTANCES VIA THE NICARAGUA AND MAGELLAN ROUTES BETWEEN THE EASTERN PORTS OF THE UNITED STATES AND THE PORTS OF THE WEST COAST OF NORTH, CENTRAL AND SOUTH AMERICA.

FROM	VIA	TO SIKAKA.	TO PORT TOWN- SEND.	TO PORT- LAND.	TO SAN FRAN- CISCO.	TO SAN DIEGO.	TO AC- PULCO.	TO SAN JOSÉ DE GUA- TEMALA.	TO HONO- LULU.	TO GUAYA- QUIL.	TO CALLAO.	TO IQUITQUE.	TO VAL- PARAISO.	TO CORO- NEL.
Portland, Me.	Nicaragua.....	6,418	5,891	5,766	5,116	4,668	3,291	2,736	6,626	3,441	3,946	4,588	5,173	5,356
	Magellan*.....	15,021	14,494	14,360	13,719	13,342	11,860	11,466	14,854	10,428	9,707	9,226	8,466	8,235
Boston.....	Nicaragua.....	6,373	5,856	5,731	5,081	4,933	3,256	2,761	6,591	3,403	3,911	4,553	5,138	5,321
	Magellan*.....	14,986	14,459	14,334	13,684	13,307	11,861	11,431	14,819	10,393	9,672	9,199	8,431	8,200
New York....	Nicaragua.....	6,223	5,600	5,571	4,921	4,473	3,096	2,541	6,431	3,246	3,751	4,393	4,978	5,161
	Magellan.....	15,016	14,489	14,364	13,714	13,337	11,861	11,461	14,849	10,423	9,702	9,221	8,461	8,230
Philadelphia.	Nicaragua.....	6,171	5,636	5,511	4,861	4,413	3,036	2,481	6,371	3,186	3,691	4,333	4,918	5,101
	Magellan*.....	15,066	14,539	14,414	13,764	13,387	11,901	11,511	14,899	10,473	9,752	9,271	8,511	8,280
Baltimore....	Nicaragua.....	6,143	5,616	5,491	4,841	4,393	3,016	2,461	6,351	3,166	3,671	4,313	4,898	5,081
	Magellan*.....	15,078	14,551	14,426	13,776	13,399	11,933	11,523	14,911	10,485	9,764	9,223	8,523	8,292
Norfolk.....	Nicaragua.....	6,013	5,486	5,361	4,711	4,263	2,886	2,331	6,221	3,036	3,541	4,191	4,768	4,951
	Magellan*.....	14,942	14,429	14,290	13,640	13,263	11,817	11,387	14,775	10,349	9,638	9,147	8,387	8,156
Charleston....	Nicaragua†.....	5,727	5,200	5,075	4,425	3,977	2,600	2,045	5,935	2,755	3,255	3,897	4,482	4,665
	Magellan*.....	14,951	14,424	14,299	13,649	13,372	11,826	11,390	14,784	10,358	9,637	9,165	8,396	8,165
Savannah....	Nicaragua.....	5,733	5,206	5,081	4,421	3,953	2,606	2,051	5,941	2,756	3,201	3,903	4,488	4,671
	Magellan*.....	14,980	14,453	14,328	13,678	13,301	11,855	11,425	14,813	10,387	9,666	9,185	8,442	8,194
Jacksonville.	Nicaragua\$.....	5,683	5,156	5,031	4,381	3,933	2,555	2,001	5,891	2,766	3,211	3,833	4,438	4,621
	Magellan*.....	14,955	14,428	14,326	13,653	13,276	11,830	11,400	14,788	10,362	9,641	9,100	8,400	8,169
Port Tampa.	Nicaragua.....	5,280	4,753	4,628	3,978	3,530	2,153	1,598	5,488	2,303	2,808	3,450	4,035	4,218
	Magellan*.....	15,116	14,589	14,464	13,814	13,437	11,991	11,561	14,949	10,523	9,802	9,321	8,501	8,339
Pensacola....	Nicaragua.....	5,386	4,859	4,734	4,084	3,656	2,259	1,704	5,594	2,409	2,914	3,556	4,144	4,324
	Magellan*.....	15,320	14,793	14,668	14,018	13,641	12,195	11,765	15,153	10,727	10,006	9,555	8,765	8,534
Mobile.....	Nicaragua.....	5,314	4,886	4,761	4,111	3,663	2,286	1,731	5,621	2,436	2,941	3,583	4,168	4,351
	Magellan*.....	15,362	14,835	14,710	14,060	13,683	12,237	11,807	15,195	10,769	10,048	9,567	8,807	8,576
New Orleans.	Nicaragua.....	5,420	4,893	4,768	4,118	3,670	2,293	1,738	5,628	2,443	2,948	3,590	4,175	3,558
	Magellan*.....	15,416	14,889	14,764	14,114	13,737	12,201	11,861	15,249	10,823	10,102	9,621	8,861	8,630
Galveston....	Nicaragua.....	5,603	5,076	4,951	4,301	3,853	2,470	1,921	5,811	2,626	3,131	3,773	4,358	4,541
	Magellan*.....	15,508	15,071	14,946	14,296	13,919	12,473	11,043	15,431	11,005	10,284	9,803	9,043	8,812

* Via Peruanpuco, Callao and San Francisco for points beyond these ports.

† Vessels going by west end of Cuba will shorten voyage 69 miles for Charleston.

‡ 104 for Savannah.

§ 136 for Jacksonville.

Comparison of Distances by the

II.—DISTANCES FROM EUROPE TO PACIFIC PORTS VIA THE NICARAGUA CANAL AND THE STRAITS OF MAGELLAN.

TO	FROM LIVERPOOL VIA		FROM HAMBURG VIA		FROM ANTWERP VIA		FROM BORDEAUX VIA		FROM GIBRALTAR VIA	
	NICARAGUA.	MAGELLAN*.	NICARAGUA.	MAGELLAN*.	NICARAGUA.	MAGELLAN*.	NICARAGUA.	MAGELLAN*.	NICARAGUA.	MAGELLAN*.
Sitka.....	8,939	15,386	9,470	15,836	9,191	15,557	8,941	15,073	8,675	14,455
Port Townsend	8,426	14,859	8,943	15,309	8,664	15,030	8,414	14,546	8,148	13,928
Portland	8,287	14,734	8,818	15,164	8,359	14,995	8,289	14,421	8,026	13,803
San Francisco	7,651	14,084	8,168	14,534	7,889	14,255	7,639	13,771	7,373	13,153
San Diego	7,201	13,707	7,718	14,157	7,439	13,878	7,189	13,394	6,923	12,776
Acapulco	5,826	12,261	6,343	12,771	6,064	12,432	5,814	11,948	5,548	11,339
San José de Guatemala.	5,271	11,831	5,788	12,281	5,509	12,002	5,259	11,518	4,993	10,990
Honolulu.....	9,161	15,219	9,778	15,669	9,399	15,390	9,149	14,906	8,883	14,288
Guayaquil	5,975	10,722	6,493	11,172	6,214	10,893	5,964	10,409	9,698	9,791
Callao.....	6,481	10,772	6,998	10,522	6,719	10,243	6,469	9,259	6,203	9,141
Iquique	7,123	9,591	7,640	10,041	7,361	9,702	7,111	9,278	6,845	8,660
Valparaíso	7,708	8,831	8,222	9,281	7,946	9,002	7,696	8,518	7,430	7,900
Coronel	7,891	8,900	8,408	9,050	8,129	8,771	7,879	8,287	7,613	7,069

* Via Pernambuco, Callao, and San Francisco for ports north of those cities.

III.—DISTANCES FROM ATLANTIC AMERICAN PORTS TO YOKOHAMA, SHANGHAI AND HONG KONG VIA THE NICARAGUA AND SUEZ ROUTES.

FROM	To YOKOHAMA VIA		To SHANGHAI VIA		To HONG KONG VIA	
	SAN FRANCISCO AND GREAT CIRCLE.	HONOLULU.	SUEZ*, COLOMBO, SINGAPORE, HONG AND SHANGHAI.	HONOLULU AND YOKOHAMA.	SUEZ†, COLOMBO, SINGAPORE AND HONG KONG.	SAN FRANCISCO GREAT CIRCLE, YOKOHAMA, AND SHANGHAI.
Portland	9,652	10,026	13,330	10,702	11,076	11,561
Boston	9,617	9,991	13,370	10,667	11,041	11,526
New York	9,457	9,831	13,564	10,507	10,881	12,320
Philadelphia	9,397	9,771	13,707	10,447	10,821	12,514
Baltimore	9,347	9,751	13,852	10,427	10,801	12,802
Norfolk	9,247	9,621	13,727	10,297	10,671	12,677
Charleston.....	9,037†	9,411†	13,982	10,087†	10,461†	12,932
Savannah.....	9,043‡	9,417‡	14,057	10,093§	10,407§	13,007
Jacksonville	9,001||	9,375||	14,137	10,051||	10,425||	13,087
Port Tampa	8,514	8,888	14,629	9,564	9,938	13,579
Pensacola	8,620	8,994	14,833	9,670	10,044	13,783
Mobile	8,647	9,021	14,875	9,697	10,071	13,825
New Orleans.....	8,654	9,028	14,929	9,704	10,078	13,879
Galveston	8,757	9,191	15,111	9,807	10,181	14,061

* Direct voyage from Singapore to Yokohama reduces this distance by 393 miles.

† Direct voyage from Singapore to Shanghai reduces this distance by 66 miles.

‡ Vessel's going by west end of Cuba will shorten voyage 69 miles for Charleston.

§ 104 miles for Savannah.

|| 136 miles for Jacksonville.

**IV.—DISTANCES FROM AMERICAN ATLANTIC PORTS TO MANILA
VIA NICARAGUA AND SUEZ ROUTES.**

FROM	VIA SAN FRANCISCO, GREAT CIRCLE AND YOKOHAMA	VIA HONOLULU AND YOKOHAMA.	VIA HONOLULU, YOKOHAMA, SHANGHAI AND HONG KONG.	VIA HONOLULU AND GUAM.	VIA SUEZ, COLOMBO, SINGAPORE.
Portland	11,402	11,776	12,563	11,469	11,367
Boston.....	11,367	11,741	12,528	11,434	11,407
New York.....	11,207	11,581	12,368	11,274	11,601
Philadelphia.....	11,147	11,521	12,308	11,214	11,744
Baltimore.....	11,127	11,501	12,288	11,194	11,889
Norfolk.....	10,997	11,371	12,158	11,064	11,764
Charleston*	10,711	11,085	11,872	10,778	12,019
Savannah†	10,717	11,091	11,878	10,784	12,094
Jacksonville‡	10,667	11,041	11,828	10,734	12,174
Port Tampa.....	10,264	10,638	11,425	10,331	12,266
Pensacola.....	10,370	10,744	11,531	10,437	12,870
Mobile.....	10,397	10,771	11,558	10,464	12,912
New Orleans.....	10,404	10,778	11,565	10,471	12,966
Galveston.....	10,587	10,961	11,748	10,654	13,148

* The route to Greytown via west end of Cuba is 69 miles less.

† The route to Greytown via west end of Cuba is 104 miles less.

‡ The route to Greytown via west end of Cuba is 136 miles less.

V.—DISTANCES BETWEEN THE EASTERN SEABOARD OF THE UNITED STATES AND AUSTRALIA VIA THE NICARAGUA AND SUEZ ROUTES.

FROM	To ADELAIDE VIA	To MELBOURNE VIA	To SYDNEY VIA	To WELLINGTON VIA	
	BRITO, TAHITI, SYDNEY, MELBOURNE.	ST. VINCENT, CAPE OF GOOD HOPE, ADELAIDE.	BRITO AND TAHITI.*	ST. VINCENT, CAPE OF GOOD HOPE AND MELBOURNE.	
Portland.....	10,954	12,446	10,446	12,954	12,529
Boston.....	10,919	12,459	10,411	12,967	13,542
New York.....	10,759	12,575	10,251	13,083	13,658
Philadelphia.....	11,699	12,641	10,191	13,149	9,616
Baltimore.....	10,679	12,736	10,171	13,244	9,596
Norfolk.....	10,549	12,614	10,041	13,122	9,466
Charleston.....	10,265	12,761	9,155	13,269	9,180
Savannah.....	10,269	12,821	9,071	13,329	9,186
Jacksonville.....	10,219	12,846	9,711	13,354	9,136
Port Tampa.....	9,816	12,443	9,308	13,751	8,733
Pensacola.....	9,922	13,447	9,414	13,955	8,839
Mobile.....	9,949	13,489	9,441	13,997	8,866
New Orleans.....	9,956	13,543	9,448	14,051	8,873
Galveston.....	10,159	13,725	9,631	14,233	9,056

*The course from Brito to Sydney direct, omitting call at Tahiti, would be 52 miles less.

Comparison of Distances by the

VI.—DISTANCES FROM LIVERPOOL TO THE EAST BY THE SUEZ AND NICARAGUA ROUTES.

TO	SUEZ ROUTE		NICARAGUA ROUTE		MILES. SUEZ— NICARAGUA†
	MILES.	PORTS OF CALL.	MILES.	PORTS OF CALL.	
Adelaide . . .	Aden,* Colombo, Kg. George Sound	11,151	Brito, Tahiti, Sydney, Melbourne|| . . . . .	13,489	-2,338
Melbourne . . .	Aden,* Colombo, Kg. George Sd., Adel	11,659	Brito, Tahiti, Sydney|| . . . . .	12,981	-1,322
Sydney	Aden,* Colombo, Kg. G. Sd., Adel, Mel	12,234	Brito, Tahiti || . . . . .	12,406	-172
Wellington . . .	Aden,* Colombo, K. G. S., Melbourne	12,949	Brito, Tahiti§	11,446	+1,503
Manila	Aden,* Colombo, Singapore	9,677	Brito, San Francisco, Yokohama†	13,937	-4,260
Hongkong . . .	Aden,* Colombo, Singapore	9,731	Brito, San Francisco, Yokohama†	13,777	-4,046
Tientsin	Aden, Colombo, Sing., Hongk., Shanghai	11,362	Brito, San Francisco, Yokohama	13,554	-2,192
Yokohama . . .	Aden, Colombo, Sing., Hongk., Shanghai	11,640	Brito, San Francisco	12,187	-547

* Direct voyage from Aden to King George Sound would shorten these routes 540 miles.

† A stop at Shanghai would add to this route 319 miles.

‡ A stop at Shanghai would add to this route 535 miles.

§ Direct voyage from Brito to Wellington would shorten this distance by 185 miles and make the difference 1,688 miles.

|| Direct voyage from Brito to Sydney would shorten these routes 52 miles.

VII.—COMPARISONS OF DISTANCES FROM NEW YORK AND LIVERPOOL TO AUSTRALASIAN AND ASIATIC PORTS VIA THE NICARAGUA AND SUEZ ROUTES.

TO	From New York		From Liverpool		MILES, ROUTE.	MILES, ROUTE.	DIFFERENCE SUEZ— NICARAGUA†
	MILES,	ROUTE.	MILES,	ROUTE.			
Wellington..	Brito, Tahiti.....	8,716	Aden†, Colombo, Kg. George Sq. Melbourne.....	12,949	4,233		
Sidney....	Brito, Tahiti*.....	9,676	Aden†, Colombo, Kg. George Sq., Adel., Melbourne.....	12,234	12,558		
Adelaide ..	Brito, Tahiti*, Sydney†, Melbourne.....	10,759	Aden†, Colombo, Kg. George Sq.....	11,151	392		
Manila....	Brito, San Francisco, Gt. Circle, Yokohama.....	11,207	Aden, Colombo, Singapore.....	9,677	-1,530		
Hongkong ..	Brito, San Francisco, Gt. Circle, Yokohama.....	11,047	Aden, Colombo, Singapore.....	9,731	-1,316		
Shanghai...	Brito, San Francisco, Gt. Circle, Yokohama.....	10,507	Aden, Colombo, Singapore, Hongkong.....	10,590	83		
Tientsien...	Brito, San Francisco, Gt. Circle, Yokohama.....	10,824	Aden, Colombo, Singapore, Hongkong, Shanghai.....	11,362	538		
Yokohama..	Brito, San Francisco, Gt. Circle.....	9,457	Aden, Colombo, Singapore, Hongkong, Shanghai.....	11,640	183		

* Omitting stop at Tahiti will shorten voyage 52 miles.

† If vessel goes by Wellington and Melbourne, voyage will be shortened 232 miles.

‡ Omitting stop at Colombo will shorten voyage 540 miles.

VIII.—COMPARISON OF DISTANCES FROM AMERICAN AND EUROPEAN ATLANTIC PORTS
VIA THE NICARAGUA AND PANAMA CANALS.

FROM	VIA	TO GUAYAQUIL.	TO CALLAO.	TO QUITO.	TO VALPARAISO.	TO CORONEL.	TO YOKOHAMA VIA SAN FRANCISCO.	TO SAN FRANCISCO.	TO SHANGHAI *VIA SAN FRANCISCO AND YOKOHAMA.	TO MANILA *VIA SAN FRANCISCO AND YOKOHAMA.	TO SINGAPORE VIA TA-	TO MELBOURNE AND SYDNEY.	TO WELLINGTON VIA TAHITI.	VIA WASHINGTON VIA
New York . . .	Nicaragua . . .	5,696	4,921	3,246	3,751	4,393	4,928	5,161	9,457	10,507	11,207	9,676	10,251	8,716
	Panama . . .	6,074	5,299	2,864	3,359	4,021	4,630	4,838	9,835	10,885	11,585	9,852	10,427	8,892
	Nicaragua . . .	5,485	4,710	3,035	3,340	4,182	4,767	4,950	9,450	10,997	10,997	9,466	10,041	8,505
Norfolk . . .	Panama . . .	5,872	5,997	2,662	3,157	3,819	4,428	4,636	9,634	10,684	11,384	9,650	9,831	8,690
Charleston . . .	Nicaragua . . .	5,276	4,598	2,866	3,331	3,973	4,555	4,741	9,037	10,505	10,505	9,250	9,831	8,206
	Panama . . .	5,673	4,998	2,463	2,958	3,635	4,229	4,437	9,344	10,367	10,809	9,451	10,006	8,491
Port Tampa . . .	Nicaragua . . .	4,753	3,978	2,303	2,805	3,450	4,035	4,218	8,514	9,504	10,264	8,733	9,308	7,773
	Panama . . .	5,328	4,553	2,098	2,593	3,255	3,864	4,072	9,069	10,119	10,819	9,086	9,661	8,126
New Orleans . . .	Nicaragua . . .	4,893	4,118	2,443	2,948	3,590	4,175	4,358	8,634	9,704	10,404	8,875	9,448	7,913
	Panama . . .	5,477	4,698	2,263	2,758	3,420	4,029	4,237	8,244	10,284	10,984	9,251	9,826	8,291
Galveston . . .	Nicaragua . . .	4,996	4,221	2,546	3,054	3,693	4,278	4,461	8,757	9,887	10,587	9,056	9,551	8,016
	Panama . . .	5,574	4,799	2,364	2,858	3,520	4,129	4,338	9,335	10,385	11,085	9,352	9,927	8,392
Liverpool . . .	Nicaragua . . .	8,426	5,651	5,975	6,481	7,123	7,708	7,891	12,187	13,237	13,937	12,406	12,891	11,446
	Panama . . .	8,813	8,938	5,603	6,098	6,760	7,369	7,577	13,624	14,324	12,591	13,166	11,631	
Hamburg . . .	Nicaragua . . .	8,943	8,168	6,049	6,998	7,640	8,225	8,408	12,704	13,754	14,454	12,923	13,498	11,963
	Panama . . .	9,242	8,467	6,032	6,527	7,189	7,798	8,006	13,003	14,053	14,753	13,020	13,595	12,060
Antwerp . . .	Nicaragua . . .	8,664	7,889	6,214	6,719	7,301	7,946	8,129	12,425	13,475	14,175	12,644	13,249	11,684
	Panama . . .	8,993	8,188	5,248	6,248	6,910	7,519	7,727	12,724	13,774	14,474	12,741	13,316	11,781
Bordeaux . . .	Nicaragua . . .	8,414	7,639	5,964	6,469	7,111	7,696	7,879	12,175	13,925	13,925	12,394	12,960	11,434
	Panama . . .	8,713	7,938	5,593	5,998	6,660	7,209	7,477	13,524	14,224	14,224	12,491	13,066	11,471
Gibraltar . . .	Nicaragua . . .	8,148	7,373	5,698	6,203	6,835	7,430	7,613	11,909	12,959	13,659	12,128	12,703	12,800
	Panama . . .	8,447	7,672	5,237	5,723	6,394	7,003	7,211	12,208	13,258	13,958	12,225	11,168	11,168

* Via Honolulu and 374 miles for Nicaragua and 352 for Panama.

+ Omitting Tahiti reduces voyage from Brito by 52 miles.

† Voyage from Brito to Sydney by Wellington is 352 miles less.

‡ Voyage from Brito to Wellington direct is 35 miles shorter.

CORNELL SUMMER SCHOOL OF GEOLOGY AND GEOGRAPHY.

The Summer School of Geology and Geography, in connection with the regular summer session of Cornell University, offers courses for students in various stages of advance in geographic science; courses for teachers in the grades, for high school and normal school teachers, and for college students and teachers. The school has been organized, and the courses arranged, in response to what seems to be a demand for instruction in geographic and geologic fact, correlated with courses in method and procedure in the teaching of the earth sciences. A broad range of geographic subject-matter is offered in the various courses. There are a number of courses on the pedagogical side, in which methods are presented rather than subject-matter; and ample provision is made for instruction in the laboratory and field aspects of the subject.

In the selection of the staff care has been taken to secure men whose previous work qualifies them to treat special phases of the subject, and whose fitness to do so will be generally recognized by teachers. The director and organizer of the school is Professor R. S. Tarr, of Cornell University, who also offers lecture courses in Physical Geography and the Geography of Europe. Geology and the Geography of the United States are offered by Professor A. P. Brigham, of Colgate University, who, like Professor Tarr, is well known as an author of successful school books. Both of these men will actively participate in the field work, in the direction of advanced study, and in the conferences, of which a feature is made. Dr. Charles McMurry, one of the best-known teachers of geography in the middle West, and the writer of several books on pedagogical subjects, relating especially to the pedagogy of geography, offers courses in Home Geography and in Grammar School Geography; Supervisor Whitbeck, of the State Normal and Model Schools at Trenton, N. J., who has achieved marked success in geographic work in his own State, and a former teacher in the Summer School of the South, offers courses on Class Room Problems and Laboratory Methods in the grades; Principal Emerson, of the Cobbet School, Lynn, Mass., one of the most active geography teachers in New England, offers lecture and laboratory work in Commercial Geography; Assistant Principal Carney, of the Ithaca High School, conducts the Laboratory Work in Physical Geography; and the other instructors are actively identified with the teaching of geography.

* Via Honolulu and 374 miles for Nicaragua and 454 for Panama.
† Owing to the shorter distance between Panama and California, the voyage from Brito to Wellington is 352 miles less than by way of Tahiti; from Panama it is 405 miles less.
‡ Voyage from Brito to Sydney by Wellington is 352 miles less than via Tahiti, and from Panama direct is 345 miles shorter.
§ Voyage from Brito to Wellington direct is 345 miles shorter.

The allied courses in the Summer Session—botany, zoology, education, history, economics, etc.—and the college atmosphere, together with the library, museum, and laboratory facilities, add to the advantages of the school.

Cornell University is beautifully situated on a hillside 400 feet above Cayuga, the most beautiful of the Finger Lakes. A better place could scarcely be found for varied field work than in this dissected plateau region of central New York, to which glaciation has added many problems of scientific interest, and formed the many gorges and waterfalls for which the region is famed. The campus is bordered by two deep gorges, one of which, Fall Creek gorge, contains five considerable waterfalls, including Ithaca Falls, 156 feet high; while within walking distance of the University are 15 good-sized cataracts, 6 of which are over 100 feet high, and one, Taughannock Falls (220 feet), is the highest fall in the State. In the field work excursions are made on foot, and by wagon, steamer, and train, to most of these points, as well as to Niagara, to the coal mines at Wilkes Barre, to Watkins Glen, to Union Springs, and to the shore of Lake Ontario. No more delightful place for a summer vacation could be chosen; and, by the proper combination of indoor and outdoor work, the teacher may escape the danger of overwork, which is the chief objection to spending the vacation at a Summer School, and yet gain an inspiration and add to the store of knowledge which every genuine teacher needs constantly to increase.

Cornell passed through a severe typhoid epidemic last winter, which, for a time, threatened to cause the abandonment of the Summer Session. This epidemic is not only past, but the town is probably safer now than ever before, for it has been for months under the care of one of the most eminent sanitary engineers of the country, and no known precaution has been omitted to guard against a possible recurrence of the epidemic. Probably few cities would undertake such thorough methods to avoid a repetition of the disease, for Ithaca is almost entirely dependent on the University, and another outbreak would be most disastrous to the University, and, therefore, to the city. It is on the assurance of Dr. Soper, the sanitary engineer in charge of the city, that Ithaca is a safe place to come to, that the plans of the Summer Session are to be carried out.

It seems unfortunate that this first attempt by an American university to offer a wide range of geographic instruction for teachers should have had its success endangered by the unforeseen outbreak of an epidemic. With the range of courses, the able staff of instructors, the connection with a large university, and in a region rich in

geographic and geologic phenomena, as well as beautiful and attractive scenically, the experiment ought to succeed, and probably will. If it does it will be an event of importance in American geography, for it will open up to teachers an opportunity to learn under good guidance how to better their work, and that will have the tendency to place geography teaching on a higher plane. Moreover, it will encourage other universities to develop similar schools. One of the great needs of geography to-day is to have the great army of teachers better trained; and such a school as this offers an opportunity for such training.

ABSTRACT OF A LECTURE BY MR. HARRY DE WINDT,

MARCH 7, 1903.

"PARIS TO NEW YORK OVERLAND."

Mr. de Windt, the Vicomte de Clinchamp, and Mr. George Hardinge left Paris in December, 1900, to reach New York by way of Siberia and Alaska. At Irkutsk, where they arrived in ten days, they took sleighs and followed the frozen Lena to Yakutsk, a journey of nearly 2,000 miles in a northeasterly direction. The temperature was from 15 to 35 degrees below zero. Horses were changed at the post-houses, thirty miles apart. It took twenty-three days to reach Yakutsk, where the horses were changed for reindeer.

The next stage was to Verkhoyansk, 600 miles to the north, and the coldest inhabited place on the globe, with an average temperature for the year of 2 degrees Fahrenheit. On this stage the post-houses were sometimes 80, sometimes 150 miles apart. They left Verkhoyansk on the 2d of March for Srednekolymsk, 1,100 miles to the northeastward. This distance was made in twenty-three days, through blinding snowstorms. At Srednekolymsk dog-sleds were procured and the travellers set out for Bering Strait. They were often without the means of making a fire, the dogs gave out and went mad, and when Chaun Bay was reached the provisions were exhausted. The next day a Chukchi settlement was found. East Cape was reached on the 19th of May. Here the party were taken on board the U. S. Revenue cutter *Thetis*, and landed on the opposite coast. Then they went by a trading steamer to Cape Nome, and thence to New York.

Mr. de Windt thinks that almost any engineering feat is possible, but he regards the building of a railroad over the vast Siberian tundras and the tunnelling of Bering Strait as enterprises little likely to attract the attention of capitalists for a long time to come.

GEOGRAPHICAL RECORD.

AMERICA.

THE MAPPING OF THE UNITED STATES.—In co-operation with the Commissioner of Agriculture of North Carolina the topographic branch of the United States Geological Survey has made considerable progress during the past two years in mapping the eastern coastal plain of North Carolina. During the past season the survey of eight atlas sheets was completed—namely, Edenton, on Albemarle Sound, and Vanceboro, Ayden, Tarboro, Rocky Mount, Wilson, Spring Hope, and Kenly, at the head of Pamlico River and west thereof.

This is a most interesting region topographically because of the exceeding flatness of the slopes and the great fresh-water marshes with which the region is covered, from which rise the brushy bog lands known in this region as *pocosons*. The object of this survey has been to furnish a basis upon which the State Agricultural Commissioner, in co-operation with the Bureau of Soils of the United States Department of Agriculture, may make a careful map and study of the soils, with a view to the further development of truck farming and tobacco-growing, which have become such important industries in this region. The rivers, as the Tar, in the neighbourhood of Tarboro, flow in wide meanders through broad valleys, and are bordered alternately on one bank or the other by steep-cut banks twenty to thirty feet in height.

Above these low flood bottoms, which are at all times swampy and are often overflowed, the upland has gentle slopes, often not exceeding five feet to the mile. Upon the higher portions of these uplands occur the *pocosons*, their characteristics being unusual and of a kind best known and best shown on the northern edge of this region in the Dismal Swamp. In the Vanceboro area Big Pocoson, probably one of the largest in the region, covering an area of about 75 square miles, has an altitude a trifle over 40 feet near its centre, the country sloping thence to the outer margins, where the elevation averages twenty feet. The whole of this and the neighbouring *pocosons* is densely covered with a heavy growth of impenetrable wood and brush. So closely does this grow that it was impossible for the surveyors to enter without incurring great expense for cutting and for building corduroy roads over the swampy land. In spite of the forbidding nature of these *pocosons*,

however, they are rapidly being reclaimed. Railroads and county highways and lumber roads have in recent years been opened into and through some of them, and, by the aid of drainage, farming has encroached upon them until some have nearly disappeared through conversion to agricultural uses.

H. M. W.

Good progress was made in 1902 in the co-operative mapping of the State of Pennsylvania by the United States Geological Survey. During that season there were mapped four atlas sheets in the central-western portion of the State, where important coal interests are developing—in Clearfield, Indiana, and neighbouring counties; also a couple of sheets in the western portion of the State and one in the eastern. The latter, the Lancaster sheet, represents some interesting topographic features, and includes an area of well-cultivated farm lands, and a portion of the Susquehanna River, in which important water-power developments are now in progress. Thousands of dollars have been recently expended in surveys for canals to divert the waters of the Susquehanna. At least two great corporations are now engaged in construction, which must make Lancaster, Columbia, and York important industrial centres in the near future.

The development of new coal lands in Indiana and Clearfield counties is a matter of recent years, and of great importance. The area shown on the maps is on the crest of the Alleghenies, where the general surface elevations average nearly 2,000 feet. The summit of the Alleghenies in this region is a high tableland, slightly eroded, the stream bottoms being at altitudes of about 1,000 feet. The crests of the tableland average 1,500 to 2,000 feet. The whole surface of the country is densely covered with timber, so that, as viewed from above, it has much the aspect of a plain, the undulating mountain surfaces and stream valleys not being visible until more nearly approached.

One of the most effective sheets mapped by this Bureau in Pennsylvania is the Newcastle sheet, which is on the border of Ohio, immediately northwest of Pittsburg. Through the centre of it, flowing north and south, is Beaver River, in a valley averaging a mile in width, bordered by steep-cut banks about 100 feet in height, above which is a broad flood-plain at an average elevation of 900 feet, and of very level and uniform slope. In this flood-plain are built the great industrial seats of Beaver Falls, Elmwood City, and Newcastle. The southwestern portion is much like that surrounding Pittsburg—a rolling, hilly country of from 1,000 to

1,200 feet in altitude. The northwestern flattens out abruptly towards the more level region bordering Lake Erie. It has very gentle slopes and changes of elevation, varying only between 1,100 to 1,200 feet.

H. M. W.

During 1902 the United States Geological Survey completed the mapping, in co-operation with the State of New York, of two of the most important resort areas in the Adirondacks. These include an area of about 500 square miles, represented on the Saranac Lake and Long Lake sheets. In the progress of this survey there had previously been completed in the Adirondacks 20 atlas sheets, covering about 5,000 square miles, and there remain unmapped not much over 1,000 square miles in the northwestern portion of the region.

The sheets above named represent some of the most interesting features of the lake region. The Saranac Lake sheet includes the Rainbow Lake and Osgood and Jones Ponds, within the Rockefeller Preserve; also Clear Lake, McCaulley, Colby, and McKenzie Ponds; also the whole of lower Saranac Lake, a portion of middle Saranac Lake, Lonesome Pond, and the flow above it known as Miller Pond. Near the centre of the sheet is Saranac Lake village. There are some agreeable contrasts in topography to be observed on this sheet. Near the southwestern corner are the high mountains bordering on Mts. Marcy, Morris, and White Face. Mt. McKenzie, the highest peak on the sheet, has an altitude of 3,872 feet. In the northwestern portion of the sheet are great level plains, true swamps, and covered mostly with blue berries, one of the best-known blueberry plains in the State of New York, extending from a few miles above Saranac to Bloomingdale Station, through which the Chateaugay railroad passes with a tangent about four miles in length. The lower Saranac River from the village to Bloomingdale wanders through another swampy blueberry plain. To the west the New York Central railroad runs through a sloping plain of considerable extent, reaching from Paul Smith's Station to Saranac Junction. Interesting features in the area are Rainbow Lake, Clear Pond, and their borders, the marginal slopes of which consist of a series of sand hills and pot-holes of rather unique topographic aspect.

The Long Lake sheet depicts the larger portion of the Raquette Pond and part of Big Tupper Lake, all of Big Simon and Follensby Ponds, also Catlin Lake, and the entire northern half of Long Lake. These lakes and ponds are in a country much more moun-

tainous and broken than that about Saranac, and the ponds are at much higher elevation, with precipitous shores rising to the higher mountains. Among the more important of these is Mt. Morris, reaching 3,163 feet. The northern portion of this area is a great flooded plain, out of which numerous low hills rise and through which the Raquette River flows into Big Tupper Lake, near Tupper Lake village. This river was one of the old thoroughfares of travel from the northern to the southern portions of the Adirondacks by boat, and in the centre of the sheet are the celebrated Raquette Falls—a most picturesque group of cascades.

H. M. W.

WATER SUPPLY AND IRRIGATION PAPERS.—In No. 76 of this series of reports published by the United States Geological Survey, Mr. H. A. Pressey says that the development of water power in this country has never made such strides as during the past ten years. The last census shows that the increase in the utilization of water power from 1890 to 1900 was about 30 per cent., or 472,361 horse power. In Maine the developed power increased 60 per cent. The paper, which is entitled "Observations on the Flow of Rivers in the Vicinity of New York City," is largely devoted to the methods of collecting data with regard to the flow of rivers, including the results of observations made on Catskill, Esopus, and Rondout creeks, and the Wallkill and Housatonic Rivers.

No. 68, by Mr. L. H. Taylor, is entitled, "Water Storage in the Truckee Basin, California-Nevada." It relates to surveys made by Mr. Taylor to learn how far the water of Truckee River may be used to develop the arid lands of Nevada. He shows that, by means of dams and other hydraulic works, a large amount of water which now runs to waste may be conducted upon vacant public land. Hydrographer Newell is of the opinion that the construction of these works would do much to increase the cultivated area and population of Nevada.

THE MARYLAND GEOLOGICAL SURVEY.—This Survey has now issued three volumes dealing with the physical features of the several counties of Maryland. Vol. I (Allegany Co.) was published in 1900, and Vols. II (Cecil Co.) and III (Garrett Co.) were issued last year. Each volume embraced a description of the surface features, geology, mineral resources, soils, climate, hydrography, forests, and other characteristics of the region treated. The papers are written by members of the State Survey or other specialists, including a number from the Washington Departments.

There are many fine photographs, most of them taken by the authors of papers during their field work, and each volume is accompanied by large-scale topographical, geological, and soil maps. These are detailed geological and geographical studies of educational and economic value to the citizens and to all who may contemplate settling or investing in these counties. A considerable number of economic deposits not yet utilized are mentioned.

The Survey has also issued Vol. IV of the *General Reports*. The volume contains an account of the results reached concerning the various changes in Western Maryland during geologic time; the latest information concerning the highways of the State and the efforts to improve their condition; and an exhaustive discussion of the extensive clay deposits of Maryland.

THE CENTRAL OHIO NATURAL GAS FIELDS.—Four reservoirs of natural gas have thus far been discovered in central Ohio. The Thurston and Newark fields were long ago exhausted, and the fields from which gas is now derived are known as the Sugar Grove and Homer. The most important is Sugar Grove, which occupies parts of Fairfield and Hocking counties. As developed in 1902, its length is 16 miles, and its maximum width 11 miles. The Homer Field, as developed in 1902, includes parts of Licking and Knox counties. Geographically and geologically they are closely related. The gas rock lies near the base of the Clinton sandstone formation, and is separated from the underlying Medina by a few feet of dark slate. The gas rock is a light-coloured sandstone of moderate grain, drills hard, and the thickness of the stratum is not definitely known, the maximum reported being 34 feet, and the average, perhaps, one-half of that. In 1902 at least 60,000,000 cubic feet of gas were taken, on an average, from the Sugar Grove field every twenty-four hours, supplying many towns in northern and northwestern Ohio, including Toledo, Columbus, Newark, Zanesville, and other towns in central Ohio; Dayton and other cities in western Ohio, and a number of other towns. This territory has passed its zenith, and, unless extensions are found, its production may rapidly decrease. The Homer field was opened in 1900, and has developed two great wells flowing about 9,000,000 and 11,000,000 cubic feet a day, besides a number of others, ranging from 4,000,000 to 6,000,000. As yet the pressure is high and the gas is supplementing the supply of fuel from Sugar Grove, and may do much more. (*The American Geologist*, April, 1903.)

PORTO RICO.—The Second Annual Report of Governor Hunt, of Porto Rico, issued from the Government Printing Office, Washington, includes an excellent summary of the resources and industries of the island. Although nearly 1,000,000 persons live on this small island, whose area is about 2,347,520 acres, only about 20 per cent. of the land is cultivated, 51 per cent. being devoted to pastures, 7 per cent. waste land, and 22 per cent. is in roads, streams, towns, and forests. Of the cultivated lands, 61,556 acres are in sugar cane, 122,358 in coffee, 4,222 in tobacco, 93,508 in beans, rice, and corn, and 17,176 in fruits. Sixty-three per cent. of the population is engaged in agriculture. There are still about 100,000 acres of public lands, some of which are valuable for agriculture and timber, and others will be available for the extension of the larger cities. The prices of agricultural land, as might be expected in so densely-populated a country, are high. The best sugar lands are valued at \$150 an acre; tobacco lands from \$60 to \$75 an acre; fruit lands from \$40 to \$50 an acre; pasture lands from \$15 to \$20 an acre; and hill lands, suitable for coffee, from \$10 to \$15 an acre. It is expected that within three years the island will have a complete system of well-built principal highways, and then short lateral roads will be built at comparatively small expense.

GEOGRAPHICAL BIBLIOGRAPHY OF CHILE.—An *Ensayo de una Bibliografía Histórica i Geográfica de Chile*, published in Santiago last year, will be very helpful in studying the history and geography of that country. The authors are Nicolas Anrique R., and L. Ignacio Silva A., and their work has been received with special favour by their countrymen. The Geographical Bibliography is introduced by a chapter on the physical geography of the Republic, which is of much value as an authoritative treatment of the subject; it occupies 49 pages. The bibliography includes 1,565 geographical titles, arranged under 17 subject-heads, with notes under many of the titles giving additional information. The systematic arrangement, according to subject and an index of authors, makes it easy to find any work included in the list.

AFRICA.

THE OUTLET OF VICTORIA NYANZA.—Mr. R. B. Buckley says in *The Geographical Journal* (April, 1903) that though many rivers and streams flow into the Victoria Nyanza the only outlet is the Nile at Ripon Falls, on the north central coast. The catchment basin of the lake is about 95,000 to 100,000 square miles, and the rainfall

is assumed to be about 30 inches a year; but only a small part of this water passes over Ripon Falls to form the Nile. The falls may possibly draw off from the lake sufficient water to lower it 9 inches or a foot in a year, but the evaporation and absorption must be at least 6 or 8 times as much as this. Ripon Falls might better be described as rapids. There is a rocky barrier of hornblende-schist, like an embankment, across the channel where the Nile issues from the lake. This barrier is perhaps 10 to 12 feet above the ordinary lake level, but it is broken in three places by gaps, through which the water rushes. The barrier from shore to shore is perhaps 1,200 feet long, and the three gaps in it are probably less than 300 feet, but they have never been measured. The water of the lake, above the barrier, is about 14 to 15 feet above that in the river below. The depth of water, as it rushes through the gaps, probably does not average more than 6 to 8 feet. Mr. Willcocks gives the minimum discharge of Ripon Falls as 25,000 cubic feet per second, and the maximum as 30,000 cubic feet; but even 30,000 cubic feet per second would draw only one twenty-fifth part of an inch off the entire surface of the lake in one day, or about one and one-fourth inches in a month.

GREAT BRITAIN'S TREATY WITH ABYSSINIA.—The treaty between Great Britain and Abyssinia, signed at Adis Ababa on May 15th, 1902, fixing the boundary between Abyssinia and the Sudan, includes two provisions which will be of great value to Egypt. In the first place, King Menelek authorises Great Britain to extend a part of the Cape to Cairo Railroad through the western region of Abyssinia; in other words, the railroad will be built from Khartum up the valley of the Blue Nile into Abyssinia, and then south across the southwest corner of that kingdom, to or near the west coast of Lake Rudolf, and then southwest to Uganda. In this way the great region of swamp and sudd, supposed to be about 12,000 square miles in extent along the upper part of the White Nile, will be avoided. It was found that it would be very difficult, if not impossible, to build the railroad through this region. It will be a great advantage to construct the road through the more healthful country to the west, which has promise of commercial development.

King Menelek also agreed not to construct or permit the construction of any works on the Blue Nile, Lake Tsana, or the Sobat River that would tend to hinder or diminish the flow of their waters to the Nile, unless with the consent of the British and Indian Governments. Egypt thus secures the full use of the rich, muddy

waters of the Blue Nile, which, to a greater or less extent, might otherwise be retained for irrigation along the upper valley of the river, where there is an important amount of arable land.

EXPLORATION OF LAKE CHAD.—*La Géographie* (March, 1903) says that since the overthrow of Rabah and the establishment of French influence in the country of Kanem, on the northeast side of the lake, Lieut.-Col. Destenave and his officers have been engaged in scientific explorations of Lake Chad and the region of the Shari River. The form of the lake, as mapped, has been considerably modified by their surveys. The islands in the west have been accurately mapped. Most of the islands, however, are towards the eastern shores, and form two great groups—the Kuri archipelago, in the large southeastern extension of the lake, where the Bahr el Ghazal flows into the Chad; and the Buduma archipelago, which skirts the coast of Kanem north of $13^{\circ} 30'$ N. lat. About 19,000 persons originating in Kanem live on the Kuri islands. They are Mohammedans, and went to the islands to escape the attacks of nomads. They live by cattle and millet raising and the fisheries. Twenty-six of the Buduma islands have a population of about 17,000 souls. They say they came from Sokoto three centuries ago. They do not intermarry with their neighbours, and each island seems to be in all respects independent of the others. The inhabitants live on milk and millet, but do not fish. The French have taken possession of all these eastern islands, most of which are low and sandy. The islands have about 80,000 head of cattle.

NACHTIGAL'S JOURNEY TO WADAI.—Le Comité de l'Afrique Française has begun the publication of a complete translation into French of Nachtigal's account of his explorations in Wadai. This famous German explorer spent six months of 1873 in the study of that region, till then almost wholly unknown, which forms the extreme eastern part of the Central Sudan. These explorations concluded Nachtigal's great work of seven years in the Sudan. French colonial expansion has now reached the border of Wadai, and for this reason it is intended to place before the French public the most complete treatment of that country in all its aspects that has yet been published. The first instalment is in Supplément 3 (*Renseignements Coloniaux et Documents*), which accompanies the March number of the *Bulletin Mensuel*. The translation will fill several supplements.

THE LIVINGSTONE MEMORIAL.—Mr. Alfred Sharpe has informed *The Geographical Journal* (April, 1903) of the completion of the monument erected to the memory of Dr. Livingstone on the site of the great explorer's death. The work has been excellently carried out by Mr. Codrington. It is made of well-burned bricks, thickly coated with cement. There are no flat surfaces on which rain can lodge, so that it may be expected to last for many years. The monument bears a tablet, on which is recorded the fact that Livingstone died on that spot. The sum of money remaining after completing the monument will be expended in the erection of a native hospital, to be known as the "Livingstone Memorial Hospital," at Fort Jameson, the European settlement nearest to the spot where the explorer breathed his last.

FISHERIES OF THE CAPE OF GOOD HOPE.—For a number of years the Government of Cape Colony has been studying the fisheries around the coasts, with a view to securing larger supplies for the home market, the present yield not keeping pace with the demand. A report on the progress of this work, made annually by the Marine Biologist, and published by the Agricultural Department, is devoted largely to the researches of a small Government steamer, which hunts for new fishing areas and makes physical observations as to temperature, currents, the nature of the sea floor, and other facts which affect sea life. In 1898 a large deep-sea fishing area was discovered near Mossel Bay, over a part of the Agulhas Banks. Further studies since that time have confirmed the first impression that in extent of fishing grounds and the quantity and quality of the fish this area of about 500 square miles is likely to become the most important source of the fish supply for the colony. Mossel Bay is on the south coast, about midway between Cape Town and Port Elizabeth, or 200 miles from the nearest market. In that warm region, with ice at about \$10 a ton, the expense of getting fish to market is important; but, by returning to the sea all the fish caught, excepting soles, which bring the best price, the new fishing grounds are now being turned to good account.

POPULATION OF MADAGASCAR IN 1902.—The population of Madagascar (Census of 1902) is 2,501,691 natives and 8,906 Europeans and other foreigners. The largest town is the capital, Tananarive, with a population of 51,620 natives and 906 foreigners. The largest foreign population is at or near the ports, the Province

of Tamatave having 2,175 foreigners; the Territory of Diego Suarez, 1,655; and the Province of Majunga, 1,213.

CLIMATE OF GERMAN EAST AFRICA.—One happy result of the growth of European "spheres of influence" in Africa is the increase in our scientific knowledge of the continent which is now less and less properly called dark. Among the notable scientific advances which are being made in equatorial Africa there is perhaps none which interests a larger body of persons than the progress in an understanding of the climatic conditions, for the future development of these African provinces depends very largely upon the possibility of their occupation, at least to some slight degree, by foreigners, and upon the kinds of crops which may successfully be grown there. The contributions to African climatology in English, French, and German are increasing rapidly in number, and all of them are of great value, and of general interest.

One of the latest of these studies was presented to the German Colonial Congress held in Berlin in October last (H. Maurer: "Das Klima von Deutsch-Ostafrika," *Meteorologische Zeitschrift*, XIX, 1902, 543). German East Africa is one of the most interesting portions of Africa, in that it lies between the equatorial belt of calms, in the northwest, and the southeast trade belt of the southern hemisphere, with the district of the northeast monsoons in the northeast. During the months from June to October the winds blowing towards the barometric equator to the north are southeast and south. These winds, coming from higher latitudes, are dry, except where they are forced to rise over mountains, and this is, therefore, the dry season over most of the district. In the five months June to October there is very little rainfall, months without any precipitation being of fairly frequent occurrence. The diurnal range of temperature is naturally large under the clear skies of this season; even on the coast it has reached 32° at Lindi. Dew is of almost daily occurrence, and supplies vegetation with needed moisture. Where the southeast trade is forced to ascend mountains, as in the case of the mountains on the south and east, near the ocean, there is rainfall, which is of great importance to the plantations in Usambara. During the summer months the northeast monsoon prevails over German East Africa, and in the intervening periods there are, as elsewhere, light variable winds and rains, which in some places last for two months (December–February). In the northeast of the colony, however, the northeast monsoon is very strongly developed, and brings a well-marked dry

season in Usambara and in the Kilimanjaro district. Here, then, are two rainy and two dry seasons, the first rainy season coming in November, and the second in March–May.

As regards temperature, the greater portion of the colony has its hottest weather before the summer rains, for during the latter season the cloudiness causes a reduction in the temperature. This type of temperature distribution is known as the *Indian* type. In the northeastern portions, however, where the rains stop in summer, the maximum temperature comes in February, about two months after the solstice, which gives the *European* type. In the northwestern corner, where the distance from the equator is only 1° , we have the *equatorial* type, mean annual range only 2° – 3° ; and a fairly uniform distribution of rainfall through the year; thunderstorms frequent and severe. The Victoria Nyanza has its own system of land and lake breezes. Maximum temperatures of over 100° have not been recorded. The hot nights are more oppressive than the hot days. During the hottest season on the northern coast, in December, 1897, at Dar-es-Salam, there were twenty-six consecutive days and nights during which the thermometer did not fall below 79° . These hot northeast monsoon nights are sleepless nights for the European, and they come at a time when malaria is most common. On the coast the mean temperature of the warmest month is 82.4° ; that of the coldest between 72° and 75° . Even on the plateaux the temperatures are not much lower, but the mountains give some relief. Usambara (about 1,200 metres) has a mean annual of 64.4° , as against 77° and 79° on the coast.

There is great variation in the rainfall from year to year. The year September, 1896–August, 1897, gave 102 inches at Tanga, and the following year gave only 23 inches. Such fluctuations cause droughts and famines in the dry years and floods in the years of heavy precipitation. A severe famine occurred in 1898 in consequence of deficient rainfall. This extraordinary uncertainty as to the annual rainfall is a very unfortunate thing for the colony, and it happens that the infancy of German East Africa has come at a particularly dry time, as is shown by the fall in the levels of several lakes in different parts of the district. While this dry period may now be at an end, the hope for the future is chiefly to be centred on those portions of the colony which have a large mean annual rainfall and which show the least variation in the rainfall from year to year. Of these more favourably situated districts Kondeland, north of Lake Nyassa, seems to be the most promising.

R. DEC. W.

POLAR REGIONS.

ICE CONDITIONS IN THE ARCTIC SEAS IN 1902.—The Danish Meteorological Institute has just published six charts of the North Polar regions showing the state of the ice in those waters for each month of 1902, from March to August inclusive. Various symbols are used to denote land floe, large ice fields, tight pack ice, open ice, bay ice and brash, and icebergs. In the larger part of the Polar domain the ice conditions, of course, are marked "unknown." The charts are accompanied by a summary of all the information received as to the ice conditions for that year. The Danish Meteorological Institute undertook the publication of this interesting annual report upon the invitation of the Seventh International Congress. The information is obtained from shipmasters, private persons, and meteorological and hydrographic establishments. It is greatly desired to increase the quantity of data, and the co-operation of every scientific man and captain crossing the Arctic seas is solicited. The charts and letterpress are bound together in convenient form for reference.

SEARCHING FOR BARON TOLL.—The hopes that Baron Toll and his zoologist, Birula, who started in the summer of 1902 respectively for Bennett Island and New Siberia Island, would meet again in the fall at Kotelnoi and travel together over the ice to the Lena delta have been disappointed. Birula returned alone, bringing no news of Baron Toll except that on his way north he reached Cape Visokyi (High Cape) on July 10th, 1902, and started again for Bennett Island. It now seems probable that if all went well with the explorer he spent last winter on Bennett Island. A relief expedition, consisting of six dog sledges, has started for New Siberia with supplies for Baron Toll; and Lieut. Kolchak has also left Siberia for the same purpose, with the intention of travelling over the ice, if necessary, to Bennett Island. The latter expedition was sent out by the Imperial Academy of Sciences at St. Petersburg. With two expeditions in the field not many months should elapse before news comes of the fortunes of Baron Toll.

NAVIGATION IN THE KARA SEA.—Mr. A. J. Varnek, in the Izviesiya of the Imperial Russian Geographical Society (No. 3, 1902), says that in many instances vessels traverse the Kara Sea and enter the Ob and Yenisei mouths without meeting ice; at other times ice blocks the way entirely. As far back as the sixteenth and seventeenth centuries Russian merchant vessels passed into the Kara Sea

from Archangelsk and Kola, sometimes reaching the mouths of the Ob and Yenisei. These daring navigators left hardly any records, and the sea route to the Ob and Yenisei was entirely forgotten at a later period; in fact, the Kara Sea was long thought to be impassable. It was only about the middle of the last century that the Kara Sea began to be revisited. Almost yearly since 1871 trading vessels have entered the Kara Sea, and others have doubled the north end of Novaya Zemlia.

The writer says that the conditions of navigation around the north end of Novaya Zemlia are not worse than through the straits south of it, and, perhaps when the distribution of ice on the northern route is better known it will prove to be the preferable highway. There is less ice in the northern than in the southern part of the sea. The conditions for forming ice in the south are more favourable than in the north. The mean winter temperature near the shores of the Arctic Ocean is lower than in the more northern part of these waters. [This fact is also recorded by Nansen.] The influence of the cold continental climate is particularly great in the Kara Sea, surrounded as it is on three sides by land and open to oceanic influences only on the north. The Kara Sea may be successfully navigated only by going north when the ice is in the south and *vice versa*; in other words, when a vessel encounters ice in Yugor Shar it ought at once to proceed to Kara Strait, and, if it fails there, it should go farther north to Matotchkine Shar, or even around the north end of Novaya Zemlia. The article is accompanied by four maps showing the distribution of ice in the Kara and White seas and adjoining parts of the Arctic Ocean from March to September, 1901.

THE ZIEGLER POLAR EXPEDITION.—Mr. Ziegler, who intends to make another attempt to reach the North Pole via Franz Josef Land, invited the National Geographic Society of Washington to designate some one to represent the Society with a view to giving authoritative endorsement to any determinations which may be made of latitude.

The Society selected Mr. William J. Peters, one of the most experienced topographers of the United States Geological Survey. Mr. Peters will have charge of the scientific work of the expedition. This is expected to include pendulum and magnetic observations, the collection of all geographic data and special collections of natural history, etc. Mr. Peters is especially well qualified for this purpose. He has spent twenty years in charge of exploring

and expeditionary parties for the Government, all in the more remote and unexplored portions of the West. For the last four or five years he has been in charge of the topographic surveys of that bureau in Alaska, and has had wide experience with Arctic conditions. Mr. Peters is also one of the most thoroughly-equipped geodesists in the service of the Government, and any determinations which he may make of geographic positions will carry with them an authority which has rarely been possessed by similar work.

H. M. W.

THE BRITISH ANTARCTIC EXPEDITION.—The steamer *Morning*, the relief ship of the British Antarctic expedition, returned to Lyttelton, New Zealand, on March 25th, with gratifying news of the work of the *Discovery* expedition during the past year. The *Discovery* entered the Antarctic pack in January, 1902, in lat. 67° , reached the north coast of Victoria Land in safety, visited Cape Adare, Wood Bay, and an excellent harbour in lat. $76^{\circ} 30'$, leaving a record of the voyage at Cape Crozier on January 22d. The steamer then pushed beyond Mounts Terror and Erebus, following the ice barrier eastward, and in long. 165° it was found to turn northward, the water becoming shallow. From the edge of the barrier high snow slopes rose to heavily-glaciated land, with here and there bare and precipitous peaks. The coast-line was followed to lat. 76° , long. $152^{\circ} 30'$, or about 150 miles beyond the furthest point previously reached in this direction.

Returning westward, the ship put into an inlet in the barrier in long. 174° , and a sledge party examined the land as far as $78^{\circ} 50' S.$. Excellent winter quarters were found near Mounts Erebus and Terror, where the ship was frozen in on March 24th; and though the weather was stormy and severe, the expedition passed a comfortable winter. The lowest temperature recorded was 62° below zero. Sledging began on September 2d, one party making a difficult journey to Mount Terror; while Commander Scott, Dr. Wilson, and Lieut. Shackleton travelled south, reaching land in lat. $82^{\circ} 17' S.$, long. $163^{\circ} W.$, thus attaining the furthest south ever reached by man. The conditions of travel were most trying. All the dogs died, and the three men dragged the sledges back to the ship, Lieut. Shackleton nearly losing his life through exposure and coming home invalided on the *Morning*. Victoria Land was found to be traversed by ranges of high mountains, which in 82° reached a height of 10,000 to 12,000 feet. Foothills resembling the Admiralty Range were found in long. 160° , and after ascending a

glacier an unbroken level plain was discovered at an altitude of 9,000 feet. The coast-line was seen stretching away nearly due south to at least $83^{\circ} 20' S.$ —about 70 miles further south than the furthest point attained.

Capt. Scott travelled 292.1 statute miles nearer to the South Pole than did Ross, and surpassed Borchgrevink's record by 238.05 miles; but when he turned back to his ship he was still 532.45 miles from the Pole. Nansen's farthest was 261, and the Duke of the Abruzzi's 239 miles from the North Pole. Many other comparisons might be given to indicate the enormous amount of work that must yet be done before our knowledge of the Antarctic is commensurate with that which we have gained of the Arctic regions.

Whether or not Victoria Land proves to be of continental dimensions, the discoveries of the expedition show that it is one of the larger islands of the world. The known north and south extent of the east coast is more than two-thirds of the length of Greenland, which now ranks first among the great islands. The results of the first year's work were large, and considerable additions may be made in the second year.

ASIA.

SEISMIC FREQUENCY AT MANILA, TOKIO, AND AGAÑA.—Observations taken in the period 1892–1897 give an average of 13 earthquake days a year at the City of Agaña, Guam. The number at Manila during the same period was an annual average of 12.4 earthquake days. The statistics for Tokio show an average of 129 earthquakes a year, but they evidently include many seismic movements that are registered only by very sensitive apparatus. In the period 1876–1891, in a total of 1,168 seismic movements registered at Tokio on such instruments, only 540 (34 a year) were so strong that their direction and intensity could be determined. The number of earthquake days at Tokio when the movement is plainly perceptible is, on an average, about 32 a year.

AMERICAN GEOLOGISTS TO VISIT ASIA.—Professors Raphael Pumpelly, W. M. Davis, and Mr. Ellsworth Huntington will visit western Asia this summer, to be gone several months, and perhaps the remainder of the year. They will cross the Caspian Sea from Baku, take the railroad to Merv and Samarkand, and return, probably, across the plain to the northwest, past the Aral Sea to Orenburg, in southeastern Russia. Professor Pumpelly has already travelled extensively in Asia. In 1861–3 he made scientific explora-

tions for the Japanese Government; in 1863-4 he conducted a private geological expedition through central, western, and northern China and Mongolia, and explored the northern coalfields for the Chinese Government; and in 1864-5 he made a journey of exploration across the Gobi desert and returned to Europe through Siberia. Professor Pumpelly, who was in London early in April, said of the proposed trip:

There have been great physical geographical changes operating through many thousands of years toward rendering central Asia more or less a desert country. These changes have produced gradual depopulation of countries that were once largely peopled with different degrees of civilization, dating back several thousand years. The object of the trip is to see whether the region offers a promising field for the study of the relation between measurable physical geographical changes and economic social and ethnographic changes, and for archaeological research in connection therewith. The journey is taken under the auspices of the Carnegie Institute for Original Research at Washington.

THE CLIMATE OF BAGUIO, ISLAND OF LUZON.—Where Europeans are called upon to live in moist tropical climates they find it highly desirable, if not absolutely necessary, to seek some relief from the continued high temperatures which prevail at sea-level by going, when possible, for part or all of the year, to some plateau or mountain station for recuperation. By so doing, continuous residence in such tropical climates is made more comfortable, and there is likelihood of escape, or of recovery, from some tropical diseases. Thus tropical mountain stations have become of considerable importance as resorts for Europeans. As Americans are now concerned with a tropical insular climate, in the Philippines, attention has naturally been directed to the possible development of a health resort in the mountains of those islands, and the plateau of Benguet, in the northwestern part of the island of Luzon, has been generally spoken of as the most likely place for such a resort. Exaggerated statements, not founded on meteorological facts, have been made regarding the use of this plateau as a means of solving the problem of acclimatization of the white race in the Philippines (see BULLETIN, XXXIII, 1901, 50-51). Fortunately, the Philippine Weather Service has established a meteorological station at Baguio, on the plateau of Benguet, so that definite conclusions may soon be drawn regarding the climatic conditions, although as yet but one year's records have been discussed ("The Climate of Baguio (Benguet)," by Rev. Father José Algué, S.J., Report of the Director of the Philippine Weather Bureau, 1901-2, Part First, 4to, Manila, 1902).

Baguio is really in a valley, surrounded by low hills, which form

a chain except on the northeast, where there is a ravine through which the valley is drained. The hills range in height from 60 to 150 ft. above the level of the valley floor, and the altitude of the station is 4,777 ft. The annual march of temperature is similar to that at Manila. February is the coldest month, and April the warmest. A second minimum occurs in August, and is probably due to the heavy rainfall of that month. The difference in the mean monthly temperatures at Manila and at Baguio ranges between 12.4° and 16.2° , as is seen in the following table:

	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.
Manila.....	77.0°	77.7°	80.4°	82.9°	83.3°	82.0°	80.8°	80.8°	80.4°	80.8°	79.0°	77.4°
Baguio.....	63.5°	62.1°	66.0°	70.5°	68.3°	67.2°	66.5°	64.6°	67.0°	67.6°	66.0°	64.3°
Difference.....	13.5°	15.6°	13.6°	12.4°	15.0°	14.8°	14.3°	16.2°	13.4°	12.8°	13.0°	13.1°

The highest monthly temperature at Baguio is below the mean temperature of the coldest month at Manila. The mean daily temperature range is 18.8° in April (maximum), and 7.5° in June (minimum).

The mean monthly relative humidities are as follows:

JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.
76%	79%	76%	74%	86%	90%	89%	93%	90%	83%	82%	84%

Baguio has a good deal of fog. The annual variation in the number of foggy days is directly proportional to the humidity. Except during July, August, and September, the mornings are free from fog. As a whole the mornings have more fog than the evenings. There is less cloud and rainfall at Baguio than at stations near the eastern (windward) coasts in November–February. The following table shows the mean monthly cloudiness (0–10):

JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.
3.6	5.1	4.6	3.8	6.8	7.4	7.0	8.9	7.3	5.0	5.3	5.7

Baguio has its dry season in January–April, as will be seen in the table of monthly rainfalls following:

JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.
0.6	0.57	1.46	0.32	4.02	12.55	15.43	37.03	11.90	4.95	2.52	5.47

Annual Rainfall: 96.29 inches.

It is hardly worth while to enter into a discussion of the climate of Baguio on the basis of but one year's record. But it may be noted that this station has considerably lower mean monthly tem-

peratures than Manila, and, therefore, does provide some relief from the sea-level conditions. The maximum temperatures thus far recorded at Baguio are also much lower than at Manila. Baguio appears to have less cloud than Manila, but is most cloudy during the months when it is most needed as a health resort. The former station also appears to have a large number of foggy days, and more rainy days than Manila.

R. C. DEC. W.

GENERAL.

THE EFFECT OF CLIMATE ON RACIAL CHARACTERISTICS—In an important ethnological article on the probable character of the American race of the future ("What Shall It Be?", *Century Magazine*, March, 1903), Mr. Gustave Michaud seeks to determine the effects which the intermingling of the different European races will have in producing an American type of future generations. The three main sub-races in the Caucasian are the Baltic, the Alpine, and the Mediterranean. Of these the Baltic, which is to be found in its purest state in Scandinavia and in Scotland, occupies the British Isles, and the plain of northern Germany, and, in a more or less mixed condition, many portions of France, central Europe, and Russia. It is believed probable that this Baltic race is the result of natural selection exercised by the colder climate of northern Europe over the members of the primitive Mediterranean race who had migrated northward. Such an hypothesis serves to explain very satisfactorily many of the mental and physical characteristics of the present Baltic race. The result of living in a more rigorous climate was that those individuals perished who did not prepare for or were unable to withstand the severe winters, while the more thoughtful, the more energetic, the more ingenious, were able to survive. Thus, the posterity of the less fit relatively decreased, while that of the more fit increased, and the result was a new type, differing much from the old, and adapted for living in more rigorous climatic conditions.

R. DEC. W.

THE PRACTICAL SIDE OF GEOGRAPHY.—Professor W. M. Davis says, in his paper on "The Progress of Geography in the Schools" (*Yearbook of the National Society for the Scientific Study of Education*, Part II), that the practical side of geography is best taught in a well-developed course of commercial geography placed in the later years of the high school, after earlier courses on general geography in the grades and a course on elementary physiography, either in the

grades or in an early high school year. Here, if anywhere, it is important that the principles of systematic ontography, developed as they should be by collegiate and university study, ought to find application.

THE JOURNAL OF GEOGRAPHY.—The second year of this interesting and helpful publication begins with its removal to Chicago, where it will be published hereafter for the editors by Rand, McNally & Co. Professor Dodge remains in charge of the literary features, while the business management devolves upon Professor Lehnerts. The January number is filled with practical suggestions for geography teachers. Mr. Andrews' article on Australia shows how geographic problems may be studied on good maps, and how maps may be used to stimulate imagination and reflection. The mangrove tree is presented as a land-making plant. The influence of the glacial period upon the economic development of our country is a fascinating topic that may be so used in the classroom as invariably to impress upon the pupil's mind the relation of geographic environment to human progress. There are many other articles and notes, economic geography being particularly well represented. The *Journal of Geography*, in devoting itself to the interests of pupils of geography in the elementary, secondary, and normal schools, occupies a field of special usefulness.

NEW MAPS.

THE UNITED STATES.—Geologic Atlas of the United States.

No. 72. Charleston, W. Va. Folio. Area 938 square miles, extending from lat. 38° to $38^{\circ} 30'$ and from long. $81^{\circ} 30'$ to 82° . This quadrangle lies in the heart of the Appalachian coal basin, and its topography is of the type which characterizes the basins where the rocks are comparatively soft and undisturbed.

No. 73. Coos Bay Folio. Oregon. Area, 640 square miles, between parallels 43° and $43^{\circ} 30'$ N. lat. and 124° W. long. and the Pacific Ocean. Among the foot hills at the western base of the Coast Range. The country is a dissected platform in which the flat-topped hills are the remnants of what were originally more extensive plains.

No. 74. Coalgate Folio. Indian Territory. Area 980 square miles, between the parallels $34^{\circ} 30'$ and 35° and the meridians 96° and $96^{\circ} 30'$. The larger part of the quadrangle lies in the territory of the Choctaw Nation. The southern half is a nearly level plain, but the large streams of the northern half have deeper and narrower valleys. Mineral resources: coal, limestone, sandstone, and clay.

No. 75. Maynardville Folio. Tennessee. Area 963 square miles, between the parallels 36° and $36^{\circ} 30'$ and meridians $83^{\circ} 30'$ and 84° . The edge of the Cumber-

land plateau crosses the northwest corner, the remainder of the quadrangle being a part of the Great Valley of the Appalachians. Resources: bituminous coal, red hematite, zinc, lead, marble, building stone, brick clays, road metal, farm lands, timber and water power.

No. 76. Austin Folio. Texas. Area 1,030 square miles, between parallels 30° and $30^{\circ} 30'$ and meridians $97^{\circ} 30'$ and 98° . A diversified surface of hills, rolling plains and level areas, part prairie and part woodland. Resources: building stone, brick clays, lime, cement, building sand, flint, road metal, artesian waters, soils, some deep and rich, others thin.

No. 77. Raleigh Folio. West Virginia. Area 944 square miles, between parallels $37^{\circ} 30'$ and 38° and meridians 81° and $81^{\circ} 30'$; lies on the southeastern margin of the Appalachian coal basin, for the most part in the drainage basin of the Kanawha River. Coal mining is the chief industry.

No. 78. Rome Folio. Georgia-Alabama. Area 986 square miles, between parallels 34° and $34^{\circ} 30'$ and meridians 85° and $85^{\circ} 30'$. The quadrangle lies in the Great Appalachian Valley. The most important mineral resources are iron ore, roofing slate, lime, building stone and bauxite, most of this mineral in the United States coming from the Rome quadrangle. The most fertile areas, excepting the river bottoms, are underlain by the Chickamauga limestone.

No. 79. Atoka Folio. Indian Territory. Area 986 square miles, between parallels 34° and $34^{\circ} 30'$ and meridians 96° and $96^{\circ} 30'$. Most of the quadrangle is in the Choctaw Nation, and embraces the Ouachita Mountain, Arkansas Valley, Arbuckle Mountain, and Red River Plain topographic types. Resources: coal (worked to some extent), granite, limestone, sandstone, and clay; and stony grazing, fertile river bottom and black marly, upland soils.

No. 80. Norfolk Folio. Virginia-North Carolina. Area 1,913 square miles, between parallels $36^{\circ} 30'$ and 37° and meridians $75^{\circ} 30'$ and $76^{\circ} 30'$. The quadrangle lies wholly within the Coastal Plain province, and includes the larger part of the Dismal Swamp. The soils vary from pure sand through sandy loam and clay to swamp muck. Under the larger part of the area the basal beds of the Columbia formation contain water which supplies hundreds of shallow private wells and a portion of the city water for Norfolk and Portsmouth.

No. 81. Chicago Folio, embracing four sheets or quadrangles, the Chicago sheet on the northeast, the Riverside sheet on the northwest, the Calumet sheet on the southeast and the Desplaines sheet on the southwest. About 785 square miles of the area shown are land surface and the remaining 107 square miles are in Lake Michigan.

No. 82. Masontown-Uniontown Folio. Two adjacent quadrangles chiefly in Fayette Co., southwest Pennsylvania.

No. 83. New York City Folio, including the Paterson, Harlem, Staten Island and Brooklyn quadrangles. (To be specially noticed.)

No. 84. Ditney Folio. Indiana. Covering a part of southwestern Indiana, including most of Pike County, Spencer, and Dubois Counties.

No. 85. Oelrichs Folio. South Dakota-Nebraska. Area 871 square miles, between parallels 43° and $43^{\circ} 30'$ and meridians 103° and $103^{\circ} 30'$. Both Black Hills and Great Plains topography appear in this quadrangle. Grazing is the chief industry of the semi-arid region. An artesian water sheet shows the area that will probably yield flowing and pumping wells.

No. 86. Ellensburg Folio. Washington. Area 820 square miles, between parallels $46^{\circ} 30'$ and 47° and meridians $120^{\circ} 30'$ and 121° , just south of the geographic

centre of the State and including the border land between the Columbia Plain and the Cascade Range. No metalliferous ores or coal have been found. The agricultural lands are chiefly confined to the alluvial areas.

MARYLAND.—Three maps of Cecil Co. Accompanying Vol. II (Cecil County) of the County Series, dealing with the physical features of the several counties of Maryland. Scale, 1:62,500, or 0.9 statute miles to an inch. Maryland Geological Survey in co-operation with the United States Geological Survey, 1902.

The maps are devoted respectively to (1) topography (contour intervals 20 feet) and election districts, (2) geological formations, and (3) agricultural soils, in which the State Survey had the co-operation of the United States Bureau of Soils.

Two maps of Garrett Co., Maryland. Accompanying Vol. III (Garrett Co.) of the County Series. Scale, 1:62,500, or 0.9 statute miles to an inch. Maryland Geological Survey in co-operation with the United States Geological Survey, 1902.

One map shows the election districts and topography; the other shows the geological formations and agricultural soils.

NOVA SCOTIA.—Map of Nova Scotia. Scale about 7.5 statute miles to an inch. Published by order of the Government of Nova Scotia. A. & W. Mackinlay, Halifax, 1902.

The usefulness of the map is enhanced by the fact that it gives an important amount of economic detail. Railroads are shown with special prominence and all the main wagon roads are laid down. The coal areas, which surpass the fisheries in value of production, are shown, by shading, from New Brunswick to the eastern edge of Cape Breton Island. The iron ore fields are similarly indicated, though their small production, as yet, is not commensurate with their large area. Nova Scotia produces an important amount of limestone, but whether it is conveniently placed near coal and iron centres, where it is needed in the manufacture of pig-iron, does not appear from this map. All places where gold has been found are indicated, and also the larger forest regions, as well as the cable lines and ocean routes, with distances to leading American and European ports. The cartographic work was done by the map house of George Philip & Son, Ltd., London, England. The clear definition of all details and the large amount of information make the map most noteworthy; but on an economic map of so large a scale many more facts of great interest might have been inserted without crowding. The chief fishing ports, for example, might have been indicated on this large map of a small region whose fisheries product was worth \$9,000,000 in 1901; and also the great apple-growing districts that are famous for the quality of their fruit and the amount of their exports.

CHILE AND ARGENTINA.—Carte Générale de la partie méridionale de la République Argentine et du Chili. In 3 sheets, scale, 1:1,500,000, or 23.6 statute miles to an inch. By F. P. Moreno, Director of the La Plata Museum and expert representing Argentina in the Chilean-Argentine Boundary Settlement. *Annales de Géographie*, No. 61. 1903. Paris, Librairie Armand Colin.

A comparatively large-scale map, showing the boundary between Argentina and Chile according to the claims of the two Governments and as fixed by the British Arbitration Tribunal on November 20, 1902. The topography and hydrography are founded upon the fine maps for which special surveys were made as a basis for the delimitation of the boundary.

CHILE AND ARGENTINA.—Grenze zwischen Argentinien und Chile nach dem Schiedsspruch vom 20 Nov., 1902. Scale, 1:2,500,000, or 39.4 statute miles to an inch. By Dr. H. Steffen. *Petermanns Mitteilungen*, No. 1, 1903. Gotha, Justus Perthes.

This map shows the extent of the claims of both countries as well as the definitive boundary as decided upon by the British Tribunal. Both this map and that mentioned above will be very useful in the preparation of new Atlas sheets.

AFRICA.

MADAGASCAR.—Madagascar. Scale, 1:1,500,000, or 23.67 statute miles to an inch. Ministry of the Colonies. Paris, 1902.

No country is now doing more for the mapping of its colonial domain than France. The work is in charge of the Colonial Geographic Service of the Ministry of the Colonies, and a large part of the information given in the maps now being issued is the result of surveys and explorations by officers of the army and navy and others officially connected with the colonial service. The work of many private explorers is also incorporated in these maps, which will be widely used by cartographers for the improvement of their atlas sheets of regions which hitherto have yielded inadequate cartographic material. This large map of Madagascar is one of the best of these products, inasmuch as the Government surveys of the past three years have made it possible to present a large amount of accurate topographic data. Tints are used to show heights.

FRENCH NEW GUINEA.—Carte de la Guinée Française. In four sheets. Scale, 1:500,000, or 7.8 statute miles to an inch. Ministry of the Colonies, Paris, 1902.

The information includes the position of trading stations, caravan routes, waterfalls, rapids, sand banks, telegraph lines, etc. The hydrographic features are clearly presented, but little attempt is made to show topography. The map will serve the needs of these early days of the development of that region.

CARTOGRAPHY IN 1900-1901.

L'ANNÉE CARTOGRAPHIQUE. Supplément Annuel à toutes les publications de Géographie et de Cartographie. Douzième supplément, contenant les modifications géographiques et politiques des Années 1900-1901. Trois feuilles de Cartes, avec texte explicatif au dos. Produced under the direction of F. Schrader, Librairie Hachette et Cie. Paris, 1903.

This useful annual summarizes, in a series of maps, the most noteworthy changes and additions that have been made to the maps by explorations, surveys, new boundaries, railroad extension, and other geographic, political, and economic modifications. The sheet devoted to America in the present number shows the areas covered by topographic and geologic surveys in the United States and Canada, a hypsometrical map of Honduras after Sapper, fine map in the *Zeitschrift* of the Berlin Geographical Society, and a map of the Eastern Cordilleras of Bolivia, according to the explorations of Pando and Conway. The Africa sheet shows the progress in railroad building throughout the continent, and the most noteworthy recent explorations. The Asia sheet gives prominence to the explorations of the Kozloff expeditions and to engineer Parsons's preliminary survey of a railroad route through the almost unknown region in China between the Yangtse River and Canton.

ATLASSES.

STIELER'S HAND-ATLAS. Neue Neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. 15 und 16 Lieferungen. Gotha: Justus Perthes. Price 60 pf. for each part containing two map sheets.

This double part contains four sheets: Nos. 32 and 33 are the northwest and northeast sheets of the Vogel 4-sheet map of the Iberian Peninsula, revised by O. Koffmann, for this edition. Scale, 1:1,500,000, or 23.6 statute miles to an inch. The cartographic detail has required little change since the last edition, but the additional clearness imparted to nomenclature, provincial boundaries and mountains by the new process of production is noteworthy. No. 83 is Habenicht's Map of West Canada. Scale, 1:7,500,000, or 118.3 statute miles to an inch. The new delineation of Athabasca, Reindeer, and other lakes, and of the drainage to Chesterfield Inlet, since the revision of 1896, shows that important work still remains for the explorer in Canada's vast domain. No. 85 is a summary map of the United States and Mexico on a scale of 1:12,500,000, or 197.2 statute miles to an inch. This is an innovation in the Stieler Atlas, which has not heretofore shown on one sheet the geographic relations of our States and Territories. The number of square kilometers in areas bounded by 5 degrees of latitude and longitude is indicated.

SPAIN AND PORTUGAL. Espagne et Portugal en 4 feuilles (Feuilles nord-ouest et sud-est). Scale 1:1,250,000, or 19.7 statute miles to an inch. Sheets 17 and 20 in the *Atlas Universel de Géographie*. January, 1903. Paris, Librairie Hachette et Cie.

The four sheets of this superior map of Spain and Portugal have now been published. The last sheet (20) is accompanied by a list of the numerous sources of information which were used in this fine work of compilation. This is the largest Atlas map of the Iberian Peninsula yet produced. The scale permits a detailed and graphic delineation of topographic features.

THE LANGUAGES OF MEXICO.

BY

CARL LUMHOLTZ.

My article on the Huichol Indians of Mexico in the *BULLETIN* for February, 1903, begins with some remarks about the tribes and languages in Mexico, too general in their character to be left without explanation.

The large territory comprising the Republic of Mexico is inhabited by native Indians, by descendants of the conquering Spaniards and other whites, and by Mestizos, or a mixture of Indians and whites. The negroes are so few in number that, to use the expression of the late Mexican Minister to the United States, D. Matias Romero, it is not worth while speaking of them. So far as I remember, I met, during my five years of travel in that

country, with only one negro, and he was an American, speaking English.

The greater part of the population of Mexico lives on the elevated plateau, while the unhealthy coast regions are the least populated. It may be said that mestizos predominate in the northern part of the country and pure-bred natives in the southern. Among the States where pure-blooded Indians are found in the greatest number may be mentioned Guerrero, Oaxaca, and Chiapas.

How great this Indian population is, and what the proportion of its constituent parts, we do not wholly know. In a new country, however progressive, everything cannot be expected at once. The configuration of the country, the want of inter-communication, and other circumstances combine to make accurate census-taking very difficult. In the remoter districts great numbers of the Indians keep away from the census-taker, out of distrust and superstitious notions, as well as from the fear of being pressed into military service.

The total population of Mexico in 1900 was (according to the Almanach de Gotha, 1903) 13,604,923. In a catalogue of the Anthropological Department of the National Museum of Mexico, presented to the Eleventh Meeting of the Congress of Americanists in the City of Mexico in 1895, Garcia Cubas makes the following estimate:

19 per cent. whites.....	1,985,117 individuals.
38 " natives of pure blood,	3,970,234 "
43 " mixed blood.....	4,492,633 "
Total.....	10,447,984 "

Though obsolete, these figures nevertheless give some idea of the proportions.

Thus by far the greater part of the Mexican population is Indian. The ethnic and psychical unity of the native American race does not preclude much diversity, and we find in the continent an astonishing number of tribes, languages, and dialects.

Humboldt gives a list of over two hundred tribes on the Orinoco and its affluents, but he despairs of offering a classification of the 80,000 natives left at the time of his visit in a territory a little larger than France. He says: "*Un voyageur ne peut offrir des travaux achevés; ce que l'on a droit d'exiger de lui, c'est de donner avec candeur les matériaux tels qu'il les a recueillis sur les lieux.*"*

* *Voyage aux Régions équinoxiales du Nouveau-Continent (Relation historique).* Tome III. Paris, 1825. Page 172.

The natives of the American continent have been less exposed to foreign influence than those in other countries. Much originality may yet be found among the tribes. This is the reason why the New World is such a prolific field for anthropological research, and why the German ethnologist, Ratzel, declared (I am not able to quote his exact words) that the light which the future will be able to throw on the early development of mankind will come through researches in America.

The tribes of Mexico do not, as a rule, intermarry, and generally do not know of the existence of other than the neighbouring tribes, who have names for each other often all but complimentary. The territory of a tribe is the world to its members. The want of solidarity among the Indians, even within the same tribe, struck me much while in Mexico. Even if I were accepted as *persona grata* in one part of the tribe, I had to begin afresh with explanations wanted about myself and my purpose as soon as I crossed a dividing river or ridge. There are constant quarrels between the different districts or sections, and, as I have explained elsewhere*:

It is not too much to say that no one district would care much if the "neighbours" (the Mexicans) were to gobble up all the rest of the tribe's domain so long as its own particular territory remained intact. Still less does one tribe concern itself with what is going on beyond its borders. This, the usual condition of primitive society, no doubt explains why it was comparatively easy for the Spaniards to conquer the Indians of Mexico.

Though Christianity during the centuries following the Conquest apparently prevailed among the tribes of Mexico, it is a fact that in the more remote parts, difficult of access, numbers of Indians still keep up their ancient beliefs and rites. It is also a fact of daily observation that, willing as an Indian is to accept the Christian doctrine, he never gives up his own religion. Only when he loses his land is he thoroughly emancipated from his aboriginal state, becoming a servant of the whites, and losing his native language. In Mexico, as elsewhere, the advance of civilization is breaking down the institutions and religions of the natives. But the diligent explorer may yet find in various parts of the country aboriginal customs and rites, or, at least, a vivid record of them; aboriginal religions, including much symbolism, may yet be definitely learnt, not to speak of the native languages, songs, and folk-lore.

Spanish is the language of the country. Most of the Indians speak it, though imperfectly. It would be impossible to find any

* Unknown Mexico. Vol. II, page 263.

tribe in Mexico where Spanish was unknown, although many individuals, mostly women and children, do not speak it, as, for instance, is the case among the Huichols.* The monks who followed the conquering soldiers, as well as later missionaries, gathered vocabularies from most of the tribes, compiled grammars and even prepared books and dictionaries in many of their languages. Even at the present time books are printed in Mexico in Mexican native languages.†

No one of these linguistic families is of equal extent and importance with the Nahuatl, more familiarly known as the Aztec, which includes a large number of languages and dialects. By including what Orozco y Berra calls the Opata-Tarahumar-Pima family (Buschmann, Gatschet, Brinton, Leon), the Nahuatl family, in its northern and southern extension, reaches from the southern part of Arizona down into Central America. Students of Aztec are enthusiastic about its refinement of style.

In Yucatan the Maya is spoken, alongside of Spanish, the Mexicans finding the native tongue a necessity.

The Indian languages have enriched the Spanish of Mexico with many new words: as *metate*, grinding stone; *mecate*, rope; *mescal*, a kind of brandy; *coyote*, prairie-wolf; *chile*, Spanish pepper; *jacal*, hut or shed; *tecolote*, owl, etc., etc.‡

The first classification of the Indian languages of Mexico we owe to the distinguished Mexican ethnologist, Orozco y Berra.§ He assumes eleven linguistic families, comprising 35 languages and 69 dialects. Besides, he gives sixteen languages that he is unable to classify. According to this authority, there should thus be 120 languages spoken to-day in Mexico, and if to these are added the 72 extinct languages which he mentions, there were spoken about the time of the Conquest 182 languages. The Mexican philologist Francisco Pimentel|| augmented this list. Many lists of Mexican languages have been compiled since then, and valuable work has been done in Mexican linguistics, both by Mexicans and

* The Statesman's Year-Book for 1903 gives the natives descended from ancient Indian tribes and speaking little or no Spanish as numbering 1,908,707 in the year 1895.

† See Recent Mexican Study of the Native Languages of Mexico. By Prof. Frederick Starr, Anthropological Department, University of Chicago. 1900.

‡ See Apuntes para un catálogo razonado de las palabras Mexicanas introducidas al castellano. Por Eufemio Mendoza. México. 1872.

§ Geografía de las lenguas y Carta etnográfica de México. Por El Lic. Manuel Orozco y Berra. México. 1864.

|| Cuadro descriptivo y comparativo de las lenguas indígenas de México. 3 vols. 2a Edición. México. 1874.

foreigners. To enter into details would, however, carry me beyond the scope of the present article. Classifications have lately been given by Prof. Otis T. Mason* and Prof. Cyrus Thomas.†

The most recent attempt was made by Dr. Nicolas León.‡ His classification, communicated to me April 16th of this year, assumes fifteen families:

- | | |
|--------------------|------------------------|
| 1. Yuman. | 8. Coahuiltecan. |
| 2. Shoshonean. | 9. Othomian. |
| 3. Serian. | 10. Zoque-Mixeán. |
| 4. Athapascan. | 11. Totonacan. |
| 5. Tañoan. | 12. Chapanecan. |
| 6. Maratinian. | 13. Tarascan. |
| 7. Nahuatlán. | 14. Mixteco-Zapotecan. |
| 15. Maya-Quichean. | |

This work is accompanied by an ethnographical map containing boundaries of the families only. The author has wisely refrained from drawing boundaries of the languages. It would have been difficult to make any changes from those given in the map of Orozco y Berra. Very extensive explorations are required to make such delineations at all trustworthy.

I am convinced that there may yet be discovered new languages or dialects in Mexico, as, for instance, in the remote and unhealthy part of the State of Guerrero. On the other hand, there can be no doubt that future researches will be able to reduce the number of linguistic families. Dr. Leon thinks that Othomi, Maya-Quiche, and Nahuatl will be found to be the three mother tongues of Mexico.

I append the latest statistics at my disposal in regard to the number of individuals representing the linguistic families of Mexico. It was compiled by Garcia Cubas, and is to be found in the catalogue of the Anthropological Department of the National Museum of Mexico, 1895, cited above. The classification of this authority is somewhat different from the one given by León:

Mexican (Nahuatlán)	1,750,000
Othomian	704,734
Mixteco-Zapotecan	580,000
Maya-Quichean	400,000
Tarascan	250,000

* In *Mexico, a geographical sketch*, compiled by the Bureau of the American Republics. Washington. 1900.

† *American Anthropologist*, Vol. IV, April-June, 1902.

‡ *Familias lingüísticas de México. Museo Nacional de México*. México. 1902.

Totonacan.....	90,000
Opata-Pima-Sonoran	85,000
Zoque-Mixean.....	60,000
Chontalan	31,000
Apachean	8,000
Matlalzingan or Pirindan.....	5,000
Huavean.....	3,800
Guaicuran or Cochimi-Laimonan	2,500
Serian.....	200
	3,970,234

GEOGRAPHY IN THE UNIVERSITY OF CHICAGO.

The University of Chicago has established a Department of Geography, and Professor Rollin D. Salisbury, of the Department of Geology, has been placed at its head. The arrangement between the Departments of Geology and Geography is such that Professor Salisbury retains his connection with the former, as heretofore, at the same time that he assumes the headship of the latter. The close connection of the two departments appears from the fact that Professor Salisbury will also act as head of the Department of Geology when Professor Chamberlin is not in residence, and Professor Chamberlin will act as head of the Department of Geography in Professor Salisbury's absence.

The Department of Geology has heretofore offered courses, both elementary and advanced, in Physical Geography, and elementary courses in Meteorology. Other courses of a geographic character have been offered by other departments, notably Geographic Botany, by the Department of Botany; Zoögeography, by the Department of Zoölogy, and Commercial Geography, by the Department of Political Economy. These courses will continue to be given, as heretofore, by these several departments, except that Meteorology will be under the auspices of the new department. The new department will not duplicate the geographic courses already given, but will, at the outset, provide courses which supplement those already established. The immediate aim of the new department will be to occupy the ground intermediate between Geology and Climatology, on the one hand, and History, Sociology, Political Economy, and Biology on the other. The courses offered at the outset will be those for which, within this field, there is greatest demand.

John Paul Goode, Ph.D., in charge of the work of Geography in the Wharton School in the University of Pennsylvania, has accepted an assistant professorship in the Department of Geography, and will begin his work the second term of the summer quarter (July 27, 1903). No other appointment will be made this year. During his first year Dr. Goode will be in residence during the second term of the summer quarter and during the autumn and spring quarters. The courses which he will give during the first year will include courses on the Economic Geography of (1) North America, (2) Europe, and (3) Tropical Countries. The central theme of these courses will be the influence of the physiography, the climate, and the natural resources of these lands on their settlement, development, and present commercial and industrial status. Research courses will also be offered for advanced students.

The geographic work of the University during the coming year will include the following courses in addition to those given in the Department of Geography:

I. In the *Department of Geology*.—(1) An elementary course in Physiography each quarter; (2) a local field and laboratory course, first term, summer quarter; (3) two field courses in Geology and Geography about Devil's Lake and the Dells of the Wisconsin, in Wisconsin, one month each, commencing June 18 and July 27 respectively; (4) a course in advanced Physiography, autumn quarter; (5) a field course (for advanced students), in the Wasatch mountains of Utah and vicinity.

Other courses which, while primarily geological, are fundamental to the proper conception of the evolution of the present geography of the continents will also be given in this department.

II. In the *Department of Zoölogy*.—Courses in Zoögeography, summer and spring quarters.

III. In the *Department of Botany*.—(1) An elementary course in Plant Geography (time not announced); (2) an elementary course in Ecology, summer and spring quarters; (3) elementary and advanced courses in Field Botany, summer and spring courses; (4) advanced courses in Geographic Botany, winter quarter; and (5) a course in Physiographic Ecology, summer and spring quarters.

IV. In the *Department of Political Economy*.—Courses in Commercial Geography, summer, autumn, and winter quarters.

School of Education.—In addition to the foregoing, courses in Geography will be given by Miss Baber in the School of Education (the Normal Department of the University). These courses are planned, primarily, with reference to the needs of teachers in the grades. Miss Baber will also conduct a field course of one month's duration during the second term of the summer quarter, beginning July 27th.

M. FROIDEVAUX'S PARIS LETTER.

PARIS, March 17, 1903.

The *Service des Côtes de France* is charged with the survey and the mapping of the coasts of continental France, as well as those of the other French coasts bathed by the Mediterranean (Corsica, Algeria, and Tunisia). It performs, for this portion of the Atlantic and Mediterranean seaboard, exactly the same duties which fall to the General Hydrographic Service for the other coasts of the globe; it traces, that is to say, the plan of the surveys to be made on our European or North African shores, it publishes the new maps resulting from these surveys, and it corrects and completes the maps already in existence by the latest information received.

The most important of these surveying expeditions within the last twenty years are: The complete survey of the Corsican coasts in 1884-1891; the hydrographical revision of the southern coast of France in 1895-1898; and the survey on a large scale, in 1896, of the lower course of streams on the northern coast of Brittany, the Arguenon, the Trieux, the Tréguier, and the Guer. Other operations during the same period were the reconnaissance of the Gironde between Blaye and the sea, that of the Loire before Paimboeuf and the Bay of Bourgneuf, that of the approaches to Brest and to Dunkerque between Nieuport and Gravelines; and in 1895 the survey of the entrance and the Lake of Bizerta, first undertaken in 1883.

It has been impracticable to organize more than a single yearly expedition for the work on the French coast; a regrettable condition, which, it may be hoped, will undergo a change for the better.

In 1900 the maps published by the *Service des Côtes* numbered 312, of which the most recent were those of the Tunisian coast, the shores of Corsica, the entrances of the Gironde, the Loire, and the Seine, the approaches of Brest, and the Lake of Bizerta. There have since appeared new charts of the southern coast of France and of Brest, while provisional charts, executed by the autophotographic process, supplied navigators at once with the most interesting results obtained by the hydrographic engineers.

Together with the new maps produced, the *Service* publishes its corrections, amounting to more than two hundred in each year, of the charts already in circulation, and besides these the volume of

the *Recherches Hydrographiques sur le Régime des Côtes*, in which are inserted the reports of hydrographic reconnaissances, and of nautical commissions, and whatever has for its object the improvement of the ports of France.

Another important section is that of the *Cartes et Archives*, which, with the *Service des Marées*, constitutes the third section of the Hydrographic Service. To this section belong the supervision of the publication and correction of charts, the furnishing of maps and nautical documents to the ports and naval stations, the purchase of foreign maps and charts, and the care and classification of the archives. It is this section, also, which brings out every two years the catalogue of French Hydrography.

The rich archives of the Hydrographic Service are subdivided into technical or *Lesser Archives* and general or scientific, denominated *Greater Archives*. The former supply the data for the construction of charts, while the Greater Archives contain memoirs and reports, manuscript and printed charts and plans, maps of the world—such as the famous Canorio of 1502—general and special maps, log-books of celebrated voyages, manuscripts of the astronomer de l'Isle, of Buache, etc. It is among these collections that M. Henry Harrisson has worked to good result.

In the *Service des Marées*, founded under the Monarchy of July and reorganized in 1886, are performed the calculations required for the *Annuaire des Marées des Côtes de France*, a publication which dates from 1839, and is still calculated in its essential parts according to the methods which Chazallon adopted from the *Mécanique Céleste* of Laplace, although there is a growing tendency to substitute for these the harmonic analysis of the tide due to Lord Kelvin, introduced into the *Service des Marées* since 1893. The *Annuaire des Marées* has published for some years a number of tables, obtained in part by means of the data of the harmonic analysis, in part (for the ports in the colonies) by means of the abridged method of Prof. Darwin;* and for some years past it is in the *Service des Marées* that the elements of the prediction of the tides have been calculated for the ephemerides of the Bureau des Longitudes, in which they have figured since the end of the XVIIith century.

Of lesser geographical incidents since the date of my last letter may be mentioned the series of lectures organized by M.

* It is to be noted that the *Service Hydrographique* has possessed since 1901 a Tide Predictor, identical with that of the London India Office, and made by Lord Kelvin's constructor.

Edmond Perrier at the Museum of Natural History, on the productions of our colonies, their geology, and their flora and fauna. A systematic, scientific collection of photographs illustrating the variations of glaciers, the phenomena of denudation and of erosion and the like, would have an especial value for students.

A first step in this direction has been made by the French Alpine Club in an exhibition of unpublished photographs of mountains. By the side of M. Vittorio Sella's views of the Himalayas, taken at a distance of 80 miles, were an excellent panorama of the Wildstrubel and some good views of Mont Blanc, the Alps of Savoy and of Dauphiny; very few, however, in other parts of the Alps, and few of the Pyrenees. Of the central *massif* of France there were two or three views, but not one of the Jura or of the Vosges; so that, as an exhibition of scenery in high mountain regions, the collection was very incomplete, while some of the photographs, to which premiums were awarded, were undeniably falsified. This is the more to be regretted that the idea of the Alpine Club was excellent and much of the work admirable. Future exhibitions will win the approbation of geographers, if the jury does not exclude the views of the lower mountain ranges, and if it insists, first of all, upon the scientific interest and value of the photographs.

The recent meetings of the Société de Géographie have been less attractive, from a scientific point of view, than some of those of last year; though exception must be made in favour of Dr. Sven Hedin's story of his last journey in Central Asia and M. E.-A. Martel's résumé of his subterranean explorations in 1899-1902, in France, in Spain, in Switzerland, and Belgium, etc. M. Martel established beyond question, by examples taken on the spot, the reality of the law of capture and absorption of water-courses by fissured terrains. Action must be taken at once against these captures, and among the most effective measures is reforesting. Returning to these ideas in the number of *La Géographie* for March, M. Martel does not hesitate to affirm, in a notice of the springs which are disappearing in the Department of Aisne, that

the struggle for the means of quenching thirst, already so sharp from the sanitary and microbian point of view, will become sharper, even as regards quantity alone, in a relatively near future. . . . It may be predicted that our planet will be parched before the sun is extinguished; and we must seek for the means of retarding this fatal process of evolution.

In an impressive address before the Alpine Club, Dr. Jacot-Guillarmod described the attempt made by himself, with three

Englishmen and two Austrians, to ascend the Himalayan peak K², or Godwin-Austen (28,281 feet high), in Kashmir. Starting at the end of March, 1902, the party reached the Baltoro glacier (56 miles long), and, beginning the ascent at a point 12,000 feet high, attained the elevation of 23,000 feet—a little more than that reached by Sir Martin Conway and his companions in 1892, after seven weeks passed above the level of 18,000 feet. We must wait for the publication of their report before pronouncing upon the scientific value of the feat accomplished by Dr. Jacot-Guillarmod and his friends.

Of explorations in progress there would be little to note except the return of Dr. Cureau and M. Bonnasiès from the frontier of the Kamerun and French Congo, that of M. Duchesne-Fournet from Ethiopia, and the departure of M. Giraud for Martinique and Guadeloupe, if the Société de Géographie had not received sad news concerning M. du Bourg de Bozas. After having reached Lake Rudolf by way of the valley of the Omo, not without fierce fights with the savage Gallas of that region, M. du Bourg de Bozas undertook to continue his journey towards the west in a diagonal direction across the continent and to descend the Welle and the Ubangi to the Congo at Brazzaville. A report written on the Nile appeared in *La Géographie* for February under the title, *From Addis Abbaba to the Nile by Lake Rudolf*, and was hardly printed when the author's death was announced. He expired at Amadis, in the Congo Free State. His companions are on their way to the West African coast with collections and materials for a publication worthy of the young explorer, who, from the very beginning, had done honour to French enterprise.

An expedition of a different kind is projected by Dr. Charcot. He plans a voyage to the Arctic, to the exploration of which France has remained almost entirely strange, according to the following scheme: To start from Tromsö and the Loffoden Islands, to land in Spitsbergen and make collections of fossils for the Museum; then to visit Novaya Zemlya and explore it up the west coast and down the east coast, and to return by the Sea of Kara. M. de Gerlache, the commander of the *Belgica*, and several savants will accompany Dr. Charcot, and the expedition is to be made under the auspices of the Academy of Sciences and the Société de Géographie.*

Some very valuable observations have been made by M. Paul

* It is reported that the Charcot expedition will be sent, not to the Arctic, but to the Antarctic.—ED. BULLETIN.

Girardin on the variations of the glaciers of the Maurienne and the Isère. He was charged by the Commission on Glaciers with the study of the upper valley of the Arc. He took photographs and sketched the lower extremity of the glaciers and the positions from which they have retreated. Retrogression dominates, but in certain cases there is a stationary condition or a tendency towards advance. It was between 1892 and 1902 that the higher level in the glaciers of the upper valley of the Arc seems to have been produced; a rise which has not affected all the glaciers, and has merely weakened temporarily the great negative variation in the course of which it took place.

While writing of glaciers, we may note the initiative taken by Gen. Arvers, of the 26th Division of Infantry, in his instructions to the officers of the Alpine troops under his orders, recommending them to make careful observations of the variations in the length of glaciers—a matter, as he justly remarks, of importance to the national defence. The withdrawal of glaciers has opened to the movement of troops the more elevated passes, which become much less practicable during periods of glaciation or are even wholly obstructed by accumulations of icy masses. If these circular instructions are made general, and the facts noted by the officers of the Alpine troops are transmitted to the Commission on Glaciers, that body will soon find itself in a position to publish a very complete annual collection of observations, important for the physical study of the French Alps.

Of recent publications in geographical journals I may call attention to an article by M. Camille Vallaux in the *Annales de Géographie* for January on the oscillations in the western coasts of Brittany. The different arguments adduced to support the theory of a sinking of this portion of our sea coast (the separation of the archipelago Ushant-Molène, the drowned forests of the beaches north of the country of Léon, the engulfed legendary cities of Ys and Tolente, the ruin of the city of Tréoultré, etc.) are very well explained by the action of marine erosion, which still continues at certain points.

In a recent Bulletin of the Marseilles Geographical Society, M. Henri Barré has indicated the principal facts which direct the grouping of the population in the Provençal country.

Two important works, by M. E. Doutté, on Southern Morocco have just been published; one (in *La Géographie* for March) is a collection of notes and impressions gathered in July, 1902, in an excursion to Figuig; the other, an extract from the first volume

of a work on Morocco, now in the press, relates to sacred cairns and practices connected with them. The *Annales de Géographie* published in January a letter of M. E. F. Gautier (who is now again in the Sahara) on the configuration of the regions traversed by him in 1902 as far as Timimun; he makes the remark that in the southern part of the department of Alger, with the exception of Mzab and El Golea, the country has the character of the desert (a striking contrast with the southern portion of Oran).

M. Charles Rabot, in a note published in *La Géographie* for March, makes us acquainted with the work of Lieut.-Col. Destenave's expedition to the region of Lake Chad. After completing the pacification of the country, begun by Commandant Lamy and M. Gentil, M. Destenave explored the two great groups of islands in the western Chad, as well as Kanem and the eastern shore of the lake on both sides of the Bahr el Ghazal. Detailed reconnaissances in the region of the Shari and in Wadai corroborated and completed the work of M. Gentil and his companions. The geology, the ethnography, the flora, etc., of the country were carefully studied, and the topographical work of the expedition is shown in a map of the territory extending from the Ubangi to the north of Kanem, drawn on a scale of 1:200,000 by Capt. Bezu. This map has been presented to the Academy of Sciences.

Another map, recently published by the *Annales de Géographie* on a scale of 1:500,000, is the result of six years' work—1894-1900—by M. Paul le Cointe on the lower Amazon River, between Faro and Alemquer.

The recent explorations of Messrs. Svenonius and Hamberg in Swedish Lapland are studied by M. Charles Rabot in *La Géographie*. The Swedish naturalists discovered mighty Alpine masses in a country believed, till then, to be occupied by plains, and M. Rabot emphasizes the three different aspects presented longitudinally by the territory between the Stora Lule elf ($67^{\circ} 30'$ N. lat.) and the Lilla Lule elf ($67^{\circ} 00'$) on one side, and between Norway and the great lakes of Sweden. In his opinion the study of the Sarjekt-jäkko and its glaciers, so happily concluded by M. Hamberg and his associates, is important for the physics of the globe.

Not to be overlooked is the paper of Prof. J. Brunhes, in the *Mémoires de la Société fribourgeoise des Sciences Naturelles*, on the Work of Running Waters and the Tactics of Whirlpools. Dr. John Ball's study of the Semma rapid, on the Nile, has just furnished a striking confirmation of the ideas advanced by M. Brunhes.

HENRI FROIDEVAUX.

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MARCH—APRIL, 1903.

BY PURCHASE.

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BY GIFT.

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The Alaska Frontier, by Thomas Willing Balch. Philadelphia, Allen, Lane & Scott, 1903. 8vo.

From Charles P. Bowditch, Boston:

Mapa Arqueológico del Territorio del Usumatsintla. Teoberto Maler. Boston, Heliotype Printing Co. (1900). 8vo. Sheet.

*From W. M. Davis, Author, Cambridge, Mass.:*The Progress of Geography in the Schools. *First Year-book of the National Society for the Scientific Study of Education, Part II.* Chicago, The University of Chicago Press, 1902. 8vo.*From The Macmillan Co., Publishers, New York:*Handbook of Climatology. Julius Hann. Translated by R. de C. Ward. (Vol. I of the 2d Edition *Handbuch der Klimatologie.*) New York, Macmillan Co., 1903. 8vo.*From the Maryland Geological Survey:*

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*From the Ministère des Colonies, Paris:*Three Maps: Guinée Française, 4 feuilles, 1/500,000, Paris (1902); Madagascar, 1/500,000, *Service Géographique des Colonies*, Paris, 1902; Tonkin et Haut Laos, 4 feuilles, 1/500,000, *Service Géographique des Colonies*, Paris, 1902.*From the Government of Nova Scotia:*

Map of Nova Scotia. Halifax, A. & W. McKinlay, s. a. Sheet.

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Map of the United States of North America (printed in German), Freiburg [1850?], 26 x 18 3/4, mounted on linen, folded; Map to Illustrate the War in China, compiled from Surveys and Sketches by British Officers, etc., London, James Wyld, 1842, 27 1/4 x 12 1/4, mounted on linen, folded in case.

BOOK NOTICES.

Memoirs of the Peabody Museum of American Archaeology and Ethnology, Harvard University, Vol. II, Nos. 1 and 2. Researches in the Central Portion of the Usumatsintla Valley*, by Teobert Maler.

The results of several expeditions undertaken by the author are here compactly set forth. The sites examined, fifteen in number, are in the States of Tabasco and Chiapas, Mexico, and the Department of Petén, Guatemala, and were visited as follows: La Reforma, Chinikihá, Cháncala, Xupa, and Lake Pethá in 1898; Piedras Negras in 1895 and 1899; El Cayo, Budsilhá, La Mar, El Chile, Anaité II, and El Chicozapote in 1897; Yäxchilan in 1897 and 1899-1900; Lake Bolonchac and San Lorenzo in 1900. In none of these sites, with the exception of Yäxchilan and Lake Pethá, had important explorations been previously made.

The work at Lakes Pethá and Bolonchac was ethnological, elsewhere archæological. The material for the former is scarce and vanishing rapidly. The few facts which Herr Maler could gather about the moribund Lacantún Mayas are of great interest. Their ancestor worship, their lack of capacity for joyfulness, their kindness and shyness, at once make further researches desirable and fascinating. Vases of stone and clay they still use in offering to the gods and old images on the old sites. It is much to be hoped that Mr. Tozzer, now at work among this evanescent race, may help to fill up the awful gap between the builders of the great prehistoric structures and the present hut-dwellers. Prehistoric buildings are scattered all over the valleys, but on the river at Piedras Negras and Yäxchilan (or Piedras Verdes) were stately cities. Community-houses, mortuary pyramids, and temples stood on the slopes in order, usually facing in some common or regular direction. Carved friezes, lintels, and walls; painting, outside and in and on the sculpture, reminding one in colour and design of Tiryns and Crete; altars and stelæ in great numbers, were here. The carving, mostly in relief, on lintels, altars, and stelæ, resembles that from Palenque, Copan, and elsewhere; the inexperienced may say they all look alike, but the identities vanish on close study, and an infinite variety of symbolism, representation, composition, expression, colour, and technique appears. Noble gods,

* Cambridge: Vol. 1, 1901; Vol. 2, 1903. Published by the Museum.

high priests, and doughty warriors are shown in contrast to common men and women and prisoners—a contrast heightened, somewhat as in archaic Greece, by differences in size and working out.

The great fault with Mayan art is over-elaboration of dress; the figure is lost in symbols and apparel. Archaic Greek art developed into the showing of the human form with drapery as an accessory, and thus reached the highest; archaic America went the other way, and failed. One welcomes the rare, occasional approaches to the nude as seen in the statue from Budsilhá (p. 92), the statue of Ketsalkoatl from Yāxchilan (p. 161), and the head from San Lorenzo (p. 206).

There are a few slips—surprisingly few—such as the placing of Cháncala on the map to the north of the Cháncala River, and in the text (p. 14) to the south of it; again, the text (p. 24) reads that the expedition moved south or southeast, whereas it must have moved southwest. Outside of these the book is wonderfully composed, translated, and printed. The style is perfection; far from dry, it contains all the archæological data obtainable. The translators, Miss Wesselhoeft and Miss Parker, deserve praise for the elimination of German abstruseness. The eighty photographic plates are beautifully done, and are absolutely indispensable to the understanding of the text. Made with a loving taking of pains, in the most favorable sunlight or at night by magnesium light by Herr Maler, they will appeal to all who have ever taken camera or excavations in hand. Equally important are the maps, which, outside of the twisting of the points of the compass in that of Yāxchilan, are admirably clear, complete, and precise.

C. P.

The Weather and Practical Methods of Forecasting It, by E. B. Dunn. 8vo, pp. viii + 356. New York, Dodd, Mead & Company, 1902.

The author of *The Weather* is already quite well known as the former Local Forecast Official of the United States Weather Bureau in New York. In this book Mr. Dunn has, as he says in his preface, "aimed to avoid all mathematical and scientific and technical terms, and to present the subject in the simplest and most popular form"; there is general, but brief, discussion of most of the subjects treated in the text-books of meteorology, and considerable attention is paid to rules for forecasting coming weather changes, both with and without the use of the daily weather map. A chapter on Climate is chiefly concerned with the question of climate in relation to diseases of the respiratory system.

It is unfortunate that a book on a subject of so great popular

interest, by a writer whose official position brought him into such prominence, should be so incomplete and so inaccurate. In the discussion of even the ordinary meteorological phenomena and processes there are frequent statements which are wholly in error, and which recall the mistakes so commonly made in the past when meteorology was in its infancy. Thus, for example, to take one striking case, the author says regarding the snow-line (page 90): *The snow limit, as observed in the mountains, is where the highest temperature of the year never sinks below 32°.* Exactly what is meant by that sentence is not perfectly clear to us. What we suppose Mr. Dunn to mean is that the snow-line is defined by the altitude at which the maximum temperature is never above freezing. This is an entirely erroneous view. The first stage in the development of the conception of the snow-line, from Bouguer to de Saussure, was dominated by the idea that snow-line and frost-line (*i. e.*, the mean annual temperature of freezing) are identical. Bouguer believed that the climatic snow-line coincides with the isothermal surface of 32°. Humboldt and Buch substituted for the mean annual isothermal surface of freezing the mean summer temperature of 32°. Alexander von Humboldt first recognized the real complexity of the problem of the snow-line in its relation to temperature, and it is now known that mean temperatures or maximum temperatures are not the only factors which control the height of the snow-line. The amount of the precipitation, and especially the amount of the winter precipitation, as snow; exposure to sunshine and to warm and dry winds; the steepness of the slopes, and the height to which the mountains rise above the region of snowfall, are all important controls. Thus it has come about that the height of the snow-line is no longer believed to be a function of the temperature alone, and to make such statements as that just quoted is simply to continue an error of many years ago.

A large number of no less great inaccuracies might be referred to; for example, the statement (pages 2 and 3) that "there is a constant circulation of air flowing from the equator towards the poles in the upper atmosphere and a counter-current which flows from the poles along the surface of the earth towards the equator." There is, however, no need to multiply these examples. *The Weather*, although the subject is popular, the book attractive in appearance, and the writer pretty generally known, because of the many serious inaccuracies which it contains can be recommended neither to the general public nor to teachers and students of meteorology.

R. DE C. W.

A Geography and Atlas of Protestant Missions. Their Environment, Forces, Distribution, Methods, Problems, Results, and Prospects at the Opening of the Twentieth Century. By Harlan P. Beach, M.A., Educational Secretary Student Volunteer Movement, Fellow of the American Geographical Society, Member of the American Oriental Society. Vol. I, Geography (x and 572 pp.); Vol. II (quarto); Statistics (31 pp.), and Atlas (18 plates and index, 23 pp.). Student Volunteer Movement for Foreign Missions. New York, 1901-1903.

This work is a survey of the Protestant missionary field, primarily prepared for members of the Student Volunteer Movement for Foreign Missions. It is a very clear and practical exposition of the present distribution of Protestant missionary enterprises, and of the work they are undertaking throughout the world. The field is viewed entirely in its present aspects, the reader being referred to general and special works for historical data. Each country is first treated in its geographical, climatic, racial, and other general aspects, giving the reader a clear conception of the environment amid which the many hundreds of missionary posts are situated. This general view is followed by a statement of the missionary influences in the field, and of the work and outlook. The relegation of statistics to a section by themselves, in the quarto volume, relieves the text of a mass of figures, and renders easily accessible an immense amount of important information, every item of which may quickly be found when it is needed. The Atlas undoubtedly contains the best series of missionary maps yet published, presenting all the information relating to the subject which can be cartographically shown. The plates are the product of the superior processes employed in the map house of John Bartholomew & Co., Edinburgh; and the result is that the maps are pleasing in appearance as well as satisfying on account of their fullness and accuracy. The work is admirably adapted for the use of mission study classes in American Colleges and Theological Seminaries, and of all who are interested in missions; nor would it be easy to find a more compact and helpful atlas for the home circle.

The Alaska Frontier. By Thomas Willing Balch, A.B. (Harvard), Member of the Philadelphia Bar. Philadelphia, Allen, Lane & Scott, 1903. 8vo.

Mr. Balch's Introductory Note says:

This monograph was prepared with the object of stating briefly, but emphatically,

the title of the United States to a continuous, unbroken *lisière*, or strip of territory, on the northwest American continental shore, between Mount Saint Elias and fifty-four degrees forty minutes north latitude. In August, 1898, the Anglo-American Joint High Commission assembled at Quebec, and soon after Canada formally made claim to a large slice of the Territory of Alaska. . . . If the Canadian Government has any serious and tangible proofs with which to support its claims it has not yet made them public.

The question between the two countries is transferred by treaty to a Commission, or tribunal of six jurists, three to be appointed by the United States and three by Great Britain.

With the Commission it must be left, but it is not easy to see how any reader of Mr. Balch's clear exposition, supported by the cumulative evidence of the twenty-eight maps presented, can fail to accept, as proved, the right of the United States to the *lisière* on the mainland, stretching from Portland Channel to Mount Saint Elias, and extending far enough inland to exclude the British possessions from access to the coast-line above fifty-four degrees forty minutes.

The book is handsomely printed and bound, and the maps are well reproduced.

The Philippine Islands, 1493-1803. Explorations by Early Navigators, Descriptions of the Islands and their Peoples, their History and Records of the Catholic Missions, as related in Contemporaneous Books and Manuscripts, showing the Political, Economic, Commercial and Religious Conditions of those Islands, from their earliest Relations with European Nations to the beginning of the Nineteenth Century. Translated from the Originals. Edited and annotated by Emma Helen Blair and James Alexander Robertson, with historical introduction and additional notes by Edward Gaylord Bourne. With maps, portraits and other illustrations. Vol. I—1493-1529; Vol. II—1521-1569. The Arthur H. Clark Company, Cleveland, Ohio, MCMIII. 8vo.

These are the first of a series of fifty-five volumes to be published, containing English translations (and also, in some cases, the original texts) of manuscripts, and printed books and documents, relating to the Philippine Islands for the 310 years beginning with the year 1493, and the Bulls of Alexander VI. to Ferdinand and Isabella, and closing with the *Estadismo*, or Itinerary, of Father Joaquin Martinez de Zúñiga in 1803.

One volume will be issued monthly until the work is completed.

The editors say, in their General Preface, that most of the material presented is now for the first time made accessible to English-

speaking readers. It is added that the aim is to secure historical accuracy, especially in that aspect which requires the sympathetic interpretation of each author's thought and intention; and to depict faithfully the various aspects of the life of the Filipinos, their relations with other peoples, and the gradual ascent of many tribes from barbarism. The volumes published are edited throughout with fidelity to this high aim.

Especially valuable is the Historical Introduction by Prof. Edward Gaylord Bourne, of Yale University (Vol. I, pp. 19-87). Those who read and meditate this Introduction will find themselves, perhaps for the first time, in possession of sound ideas as to the Spanish colonial system and the work of Spain in the Philippines.

The translations seem to be excellent, though in one place (Vol. I, p. 297) the rendering of the Spanish text has been overlooked in a foot-note. The extract of a letter from the Indies mentions three vessels under command of Magellan:

They had been sighted off the cape of San Agustin, from which point they had run about two hundred or three hundred leagues along the coast of Brasil. There they anchored in a river which flows [*properly, flowed*] across the whole of Brasil, and was of fresh water.

The foot-note reads: "This must have been the Strait of Magellan."

Cape San Agustin is within twenty miles of Recife, and at least seven hundred leagues north of the Strait of Magellan. The river of fresh water in which the ships anchored is to be identified with the Rio de La Plata, which the writer of the letter appears to have confounded (in 1522) with the strait discovered by Magellan.

The illustrations of Vol. I are: Portrait and Facsimile Signature of Magellan; Title-page of *De Moluccis Insulis*, from the First Edition in the Lenox Library; and a Map of the Philippine Archipelago.

Those of Vol. II are: Portrait of Legazpi; Portrait of Fray Andrés de Urdaneta; Signatures of Legazpi and other officials; and the Santo Niño of Cebú (image of the child Jesus found there by Legazpi's soldiers in 1565).

TRANSACTIONS OF THE SOCIETY.

MARCH—APRIL, 1903.

A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, March 17, 1903, at 8.30 o'clock P.M.

President Peary in the chair.

The following persons, recommended by the Council, were elected Fellows:

Eben Sugden.	Frederick J. Lisman.
Abraham White.	Albert J. Pitkin.
Frank B. Read.	Pierre Lorillard.
Henry Siegel.	William G. Low.
Gustave Schirmer.	Daniel W. McWilliams.
Elijah W. Sells.	Walter McDougall.
Lester J. Saul.	John B. Kerr.
J. O. von Schmid.	Victor F. Lawson.
William E. Wheelock.	Frederick D. Ives.
Henry R. Wilson.	Jesse W. Reno.
Thomas G. Shaughnessy	Horace P. Whitney.
Frank F. Proudfit.	Arthur L. Lesher.
George H. Proctor.	Gustavus Maas.
Albert S. Roe.	James N. Jarvie.
John Wier.	Russell W. Porter.
Henry L. Shippy.	Prof. A. E. Burton.
Charles Pfizer.	James M. Lehmaier.
Charles Reed.	George Herrmann.
James B. Reynolds.	John Morris.
E. A. Richard.	Francis Taylor Maxwell.
Thomas Potts.	Edward W. Scott.
Robert Rogers.	Miss Rebecca Harvey.
Charles Brodie Patterson.	Richard M. Raven.
Fred W. Snow.	William Stanton Root.
James Tolman Pyle.	Hugh L. Harrison.
Frederick T. Steinway.	Herbert L. Satterlee.
James F. Sutton.	Albert Goldman.
Rudolph E. Schirmer.	Frank T. Fitzgerald.
Joseph J. O'Donohue, Jr.	Henry F. Poggenburg.
Eugene E. Osborn.	A. Wendell Jackson.

Evan Randolph.	Edmond H. Hamilton.
Augustus Prentice.	George F. Hodgman.
Harry L. O'Connor.	Charles B. Hill.
Jacob Siegel.	Lowell Lincoln.
George H. Smith.	Ernest L. Simpson.
Clinton L. Rossiter.	Thomas T. Gaff.
William I. Overstreet.	Theodore P. Gilman.
B. Sherwood Dunn.	Abraham Gould Jennings.
Walton D. Mann.	Lajos de Loczy.
Clarence H. Mackay.	

The President then addressed the Society:

I have to announce that at the last meeting of the Council the Cullum gold medal was awarded to H. R. H. Luigi Amedeo, Duke of the Abruzzi, for his ascent of Mount St. Elias and his Arctic voyage in the *Stella Polare*.

For several reasons it gives me special pleasure to be able to announce this award.

I have followed the Duke of the Abruzzi both in his Mount St. Elias expedition and in his Arctic voyage with the greatest interest. His work has a quick, effective character, which is particularly attractive.

Few, perhaps, can appreciate better than I the qualities which enabled him to fit out his Polar expedition with such completeness and intelligence; the qualities which encouraged and kept up his men in their arduous and splendid journey to the highest North, and the qualities which enabled him to repair his crippled ship and bring her safely home.

Besides the personal satisfaction which his work must have brought to the Duke, his expedition, regarded from a purely utilitarian point of view, has been worth to Italy many times more than its actual cost in increased prestige.

He has forced the civilized world to recognize the fibre of which Italians are made, and there is probably not an Italian to-day, at home or abroad who is not prouder because Luigi Amedeo did what he did.

But he appeals to me in another way. He is a striking example of a young man of wealth and position, without even the incentive, so powerful with many, of making a name for himself—for he already held a proud one—urged by the manly spirit within him to devote his time and means to accomplishing something in the world, instead of wasting both in mere amusement.

We have hundreds of young men of means who might pattern after the Duke of the Abruzzi. Let them buy or hire a ship and go somewhere, and do something, or find out something. There could be no better school for all the manly qualities. There could be no better training for future responsibilities; and, if one has the money, there are few things more enjoyable than fitting out an expedition.

And if one of these young men should perchance find virgin land on which to set his foot, or should force his ship into waters that never saw the gleam of sail before, he will experience sensations different from any that civilization can give him, and will etch upon his brain pictures and impressions which will last him to his dying day.

Both on account of his successful achievements, and the shining example which he has given us, I congratulate this Society on its selection of the Duke of the Abruzzi for the award of the Cullum gold medal.

President Peary then introduced the speaker of the evening, Mr. Harry de Windt, who described the incidents of his journey from Paris to New York by land. Illustrations were thrown upon the screen.

On motion, the Society adjourned.

A Regular Meeting of the American Geographical Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, April 14, 1903, at 8.30 o'clock P.M.

Vice-President Moore in the chair.

The following persons, recommended by the Council, were elected Fellows:

William Greene Roelker.	William H. Ellis.
Charles H. Mellon.	Russell R. Cornell.
William C. Endicott.	Victor I. Cumnock.
Nathan Herrmann.	Charles N. Brizse.
Isaac E. Gates.	Grenville M. Dodge.
Peter Cooper Hewitt.	F. Q. Brown.
Edward W. Humphreys.	Charles Griswold Bourne.
C. H. Pepper.	Morgan R. Ross.
John J. Donovan.	Charles L. Bernheimer.
Julius Heimann.	Henry A. Caesar.
Theodore W. E. de Lemos.	John A. Amundson.
William B. Dana.	Benjamin D. Brown.
Charles J. Faulkner.	Henry W. Schloss.
John G. Robin.	George R. Bunker.
Eckhardt V. Eskesen.	James C. Atwater.
Robert B. Hirsch.	Harold Binney.
Samuel P. McConnell.	Frank G. Bigelow.
James Furman Kemp.	Edward H. Hobbs.
R. D. Douglass.	Joseph C. Batchelor.

The Chairman then introduced Dr. Elmer L. Corthell, who addressed the Society on the experiences of Two Years in the Argentine Republic as Consulting Engineer of the Ministry of Public Works.

Stereopticon views were shown.

On motion, the Society adjourned.

OBITUARY.

PAUL DU CHAILLU.

A telegram from Saint Petersburg announces the death of the famous explorer in that city on the 30th of April.

Paul Belloni Du Chaillu was of French parentage, but authorities differ as to the place and the date of his birth. His own written statement must be accepted as final. He was born in Paris, July 31, 1835.

Du Chaillu's father was a trader on the west coast of Africa, and Paul's early years were passed at the Gaboon, where he was taught by the missionary Fathers. He showed great fondness for natural history, and made himself acquainted with the languages and the customs of the native tribes. He was still a very young man when he set out with a few native companions on an exploring expedition into Central Africa. From this journey, which lasted nearly four years, he returned with sixty previously-unknown species of birds, with specimens of the gorilla, and with a fund of strange information concerning the pygmy races of the great equatorial forest. His book, *Explorations and Adventures in Equatorial Africa*, published in 1861, was received with ridicule and incredulity; but, one by one, his observations and discoveries were confirmed by later travellers, and his reputation was established.

In 1863, he visited Africa again and spent two years in the explorations described in *A Journey to Ashango Land*, brought out in 1867. In 1871, Du Chaillu went to Sweden and Norway, where he lived and travelled for more than five years, studying the people and their institutions, and writing *The Land of the Midnight Sun*, published in 1881. This was followed in 1889 by *The Viking Age*, his most ambitious work.

His habits of keen observation and his lively descriptions made Du Chaillu a favourite with young readers, for whom he wrote with unwearied industry.

His buoyant and youthful temperament seemed to defy the lapse of time, and to those who bade him farewell two years ago, when he went to Russia, the news of his death comes as a thing not to be believed. His was a kindly and generous nature, steadfast and true in friendship, and without bitterness, even where he had been wronged.

Mr. Du Chaillu was a Corresponding Member of the American Geographical Society from 1860 to 1868, a Fellow from 1868 to 1892, and again a Corresponding Member for the years 1892-1903.